

AD-A130 042

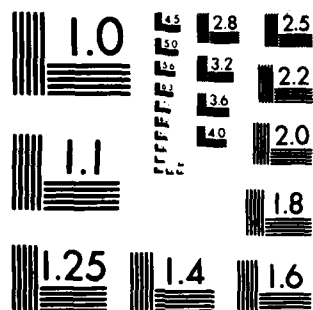
RADAR BACKSCATTER CROSS-SECTIONS AND ICE
CHARACTERIZATION FOR MAY 1977 PO..(U) KANSAS
UNIV/CENTER FOR RESEARCH INC LAWRENCE REMOTE SENSING L
.. R G ONSTOTT ET AL. FEB 83 F/G 20/14

1/1

UNCLASSIFIED

F/G 20/14 NL

END
DATE
FILMED
7-83
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

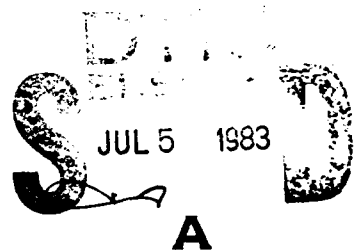
CRINC



REMOTE SENSING LABORATORY

12

ADA 130042



DTIC FILE COPY

This document has been approved
for public release and its
distribution is unlimited.



THE UNIVERSITY OF KANSAS CENTER FOR RESEARCH, INC.

2291 Irving Hill Drive—Campus West Lawrence, Kansas 66045

88 06 17 015

RADAR BACKSCATTER CROSS-SECTIONS
AND ICE CHARACTERIZATION FOR
MAY 1977 PT. BARROW EXPERIMENT
-- FINAL DATA REPORT --

R.G. Onstott
R.K. Moore

Remote Sensing Laboratory
Center for Research, Inc.
The University of Kansas
Lawrence, Kansas 66045

RSL Technical Report
RSL TR 331-27

February 1983

Supported by:

OFFICE OF NAVAL RESEARCH
Department of the Navy
800 N. Quincy Street
Arlington, Virginia 22217

Contract N00014-76-C-1105

ABSTRACT

✓ Radar backscatter measurements were made of shorefast sea ice and fresh water ice near Point Barrow, Alaska, in May 1977 with a transportable microwave spectrometer, TRAMAS, that swept from 1-2 GHz and 8-18 GHz, viewed angles from 10° to 70° from nadir, and had antenna transmit-receive polarizations of vertical-vertical, horizontal-horizontal, vertical-horizontal, and horizontal-vertical. Thick first-year sea ice, multiyear sea ice, a small first-year pressure-ridge, and fresh water lake ice were investigated. Included herein are the radar backscatter cross-sections and ice characterization data.

1.0 INTRODUCTION

Radar backscatter data were acquired during the month of May 1977 on shorefast sea ice off the coast of Point Barrow, Alaska, and on two frozen fresh-water lakes near the coast. Measurements were conducted using a four-antenna frequency-modulated continuous-wave 1-2 GHz and 8-18 GHz calibrated radar (scatterometer) mounted on a portable surface-based structure which placed the antennas at a fixed range from the ice surface. The radar parameters included multiple frequencies, like- and cross-antenna polarizations, and numerous angles of incidence. Nominal system specifications are detailed in Table 1. Calibration of the scatterometer was achieved by frequently passing the radar signal through a delay line of known attenuation and by less frequently observing targets of known radar cross-sections (triangular corner reflector and Luneberg lens). Reduction of

fading effects of constructive and destructive interference of the signal components of the scattering elements within the resolution cell was accomplished by increasing the number of independent samples through frequency and spatial averaging. Frequency averaging consisted of sweeping with bandwidth in excess of that required for resolution and spatial samples were obtained through physically repositioning the radar footprints.

Ice characterization was performed at the time of the radar measurements. The snow pack was described according to depth; density; surface temperature; a general description of grain size, shape and texture; and surface roughness. The ice was described according to type, thickness, surface roughness (both large- and small-scale), surface temperature, salinity profile, and vertical inhomogeneities (based on a visual core examination. The seven ice sites investigated included thick first-year sea ice, multiyear sea ice, a small pressure-ridge composed of first-year ice, a lake completely frozen to its bottom, and a lake with water underlying the ice. Site descriptions are included in Table 2. Large variations in air and ice temperature at the same site result from the fact that a set of measurements commonly required several hours and, in some cases, more than one day. Appreciable variations in snow thickness also had a major effect on the temperature of the upper ice surface.

Accession For
NTIS GRA&I
DTIC
Use of this document is unlimited
Added on file

DTIC
COPY
INSPECTED
2

0035
of
1

11/1

R

TABLE 1
NOMINAL SYSTEM SPECIFICATIONS

	<u>Ku-X-band</u>	<u>L-band</u>
Type	FM-CW	FM-CW
Frequency Range	8-18 GHz	1.5 GHz
Modulating Waveform	Triangular	Triangular
FM Sweep: Δf	1 GHz	800 MHz
Transmitter Power	14-19 dBm	19 dBm
Intermediate Frequency	50 kHz	50 kHz
IF Bandwidth	10 kHz	10 kHz
Antennas		
Receive Type	46 cm. Reflector	91 cm. Reflector
Transmit Type	31 cm. Reflector	Standard Gain Horn
Feeds	Dual Ridge Horn	Log Periodic
Polarization Capabilities	HH, HV, VV, VH	VV, VH
Target Distance	10.7 meters	6.1 meters
Transmit Beamwidth	8.2 ⁰ at 8 GHz 4.0 ⁰ at 17.7 GHz	27 ⁰
Receive Beamwidth	5.3 ⁰ at 8 GHz 2.3 ⁰ at 17.8 GHz	9.5 ⁰
Incidence Angle Range	10 ⁰ - 70 ⁰	10 ⁰ - 70 ⁰
Calibration		
Internal	Signal Injection (delay line)	Signal Injection (shorted delay line)
External	Luneberg Sphere Reflector	Square Trihedral Corner Reflector
Operating Temperature Range	-50 ⁰ C to +50 ⁰ C	-50 ⁰ C to +50 ⁰ C

TABLE 2
SITE DESCRIPTIONS

ICE TYPE (Thickness)	SITE NUMBER	SNOW		ICE		Temperature (°C)		Brine Volume of Top 0.10 Meters (0/00)	SITE DESCRIPTION
		Mean Thickness and Range (m)	Mean Density and Range (gm)	Thickness (m)	Salinity (0/00)	Air	Ice Surface		
Thick first-year (1.45 m)	1	0.10 (0.06-0.14)	312 (288-316)	1.65	7.7	-4.2 to -7.0	-4.0 to -5.8	99	Ice surface composed of pancakes 2-3 m in diameter. General topography is flat except for 4 cm high vertical steps at the edges of the pancakes. Upper 24 cm of core is frozen slush. Scrapings of top 1 m of ice gave salinity of 13 0/00.
Melt-year (> 3 m)	2	0.10 (0.01-0.19)	222 (245-304)	> 3	0.7	-2.0 to -3.0	-2.0 to -8.0	18	Measurements made on a 50 cm high melt hummock that was ca. 2 m in diameter. Small scale roughness on hummock was usually 4 mm, although occasional 1 cm high roughness elements occur. Upper 3 cm of ice is granular with grain size of ca. 1 mm and a salinity of 3.2 0/00. Top 55 cm of core contains spherical bubbles up to 4 mm in diameter, below 55 cm structure is congelation ice.
Thin first-year (1.31 m)	3	0.02 (0.01-0.03)	---	1.37	7.0	-5.0 to -10.5	-3.5 to -6.0	102	Very flat, uniform unrafted ice. Scrapings of upper ice surface gave salinity of 12 0/00. Strong preferred horizontal c-axis alignment is present in ice 15 cm below upper surface (mean c-axis direction 350 true).
First-year pressure-ridge (2.3 m)	4	0.16 (0.00-0.43)	344 (222-356)	1.40	8.5	-8.0 to -11.0	-5.0 to -7.0	61	Small first-year pressure-ridges. Ice blocks composing ridges are 10 cm thick (ridge formed in fall when ice was thin). Width of the base of the ridge sail is 2 m, sail height approximately 0.9 m. Surrounding undeformed first-year ice is 1.3 m thick.
Melt-year (> 3 m)	5	nil	---	> 3	0.7	-1.0 to -6.0	-4.0 to -5.0	9	Ice surface is flat on large-scale. Pronounced small scale melt produced roughness with a height of 0.5 to 1.0 cm. Upper 130 cm of core showed layered bubbly structure, below 130 cm ice is normal congelation ice.
Entire core (2.06 m)	6	nil	---	2.10	0.1	+2.0 to -2.0	-0.5 to -2.0	N/A	Ice core below 90 cm was wet (water appears in drill hole). The ice was not frozen to the lake bed.
5. Freshwater (1.74 m)	7	0.18	431 (416-448)	0.74	.06	+4.0 to +11.0	0.0 to -0.5	N/A	Upper ice surface is very smooth and snow covered. The ice was frozen completely to the bottom of the lake.

2.0 RADAR BACKSCATTER CROSS-SECTIONS

Radar backscatter cross-sections, σ° , have been divided into two frequency bands, 1-2 GHz and 8-18 GHz. The cross-sections of individual looks at an ice site, the average radar cross-section for an ice site, and the average radar cross-section for an ice type are presented in the data. In the data, angles have been shown as multiples of 10. See Table 3 for the precise angle-of-incidence.

TABLE 3
CONVERSION TABLE TO CORRECT ANGLES OF INCIDENCE
SHOWN IN DATA FILES

Angle shown in data file	Correct angle (degrees)
10	12
20	22
30	35
40	42
50	51
60	60
70	70

SEA ICE DATA SPRING 1977 EXPERIMENT
GROUND SYSTEM L-BAND RADAR CROSS SECTIONS

Average σ^0 for L-Band Experiment
Spring 1977

Angle	10	20	30	40	50	60	70
-------	----	----	----	----	----	----	----

Thick First Year

VV	-4.90	-3.88	-15.34	-17.76	-18.23	-19.78	-19.69
VH	-9.72	-13.42	-17.14	-18.15	-20.12	-19.51	-19.78

Multiyear

VV	-5.78	-11.26	-14.06	-15.79	-17.67	-18.96	-20.63
VH	-10.25	-14.42	-18.02	-18.20	-20.95	-21.62	-22.91

Pressure Ridge

VV	-1.66	-3.46	-4.50	-6.94	-12.56	-13.35	-17.31
VH	-7.15	-8.14	-9.81	-12.37	-17.45	-19.01	-19.85

Lake

VV	-13.14	-15.92	-23.01	-24.11	-25.06	-25.20	-25.53
VH	-14.51	-21.37	-25.68	-26.14	-27.57	-27.74	-28.04

Average σ^0 for L-Band Experiment
Spring 1977

ANGLE	10	20	30	40	50	60	70
SITE- 1							
VV	0.70	-0.25	-4.75	-6.07	-6.66	-7.30	-7.54
VH	-6.94	-10.70	-11.39	-11.66	-14.00	-12.52	-13.42
SITE- 2							
VV	-4.63	-10.46	-13.41	-15.32	-16.71	-17.99	-19.06
VH	-8.87	-12.86	-17.58	-17.80	-19.33	-19.93	-21.55
SITE- 3							
VV	-6.00	-10.56	-13.67	-16.16	-17.41	-17.59	-18.82
VH	-7.42	-12.63	-16.46	-17.45	-18.25	-19.00	-18.49
SITE- 4							
VV	-1.66	-3.46	-4.50	-6.94	-12.56	-13.35	-17.31
VH	-7.15	-8.14	-9.81	-12.37	-17.45	-19.01	-19.85
SITE- 5							
VV	-7.35	-12.24	-14.82	-16.32	-18.91	-20.22	-23.11
VH	-12.23	-16.88	-18.51	-19.84	-23.44	-24.42	-25.13
SITE- 6							
VV	-13.14	-15.92	-23.01	-24.11	-25.06	-25.70	-25.53
VH	-14.51	-21.37	-25.68	-26.14	-27.57	-27.74	-28.04
SITE- 7							
VV	-13.26	-15.89	-21.76	-24.67	-26.11	-28.12	-28.65
VH	-16.73	-19.36	-24.31	-27.24	-28.46	-28.51	-29.18
SITE- ALL							
VV	-4.29	-6.58	-10.19	-11.90	-13.35	-14.05	-14.70
VH	-9.35	-13.26	-15.43	-16.39	-18.77	-18.33	-19.03

ANGLE	10	20	30	40	50	60	70
-------	----	----	----	----	----	----	----

DATE- MAY 14, 1977 SITE- 1 LOOK- 1

VV	-0.08	-1.66	-13.76	-16.97	-16.00	-18.01	-15.84
VH	-12.43	-16.13	-15.84	-17.59	-20.10	-17.48	-20.05

DATE- MAY 14, 1977 SITE- 1 LOOK- 2

VV	-13.95	1.37	-13.33	-14.78	-15.26	-16.97	-16.79
VH	-13.87	-15.86	-18.82	-19.49	-21.53	-20.00	-20.94

DATE- MAY 14, 1977 SITE- 1 LOOK- 3

VV	1.45	0.69	-2.20	-4.30	-5.45	-6.40	-7.84
VH	-16.93	-17.10	-17.64	-18.46	-21.25	-21.28	-19.36

DATE- MAY 15, 1977 SITE- 1 LOOK- 4

VV	-0.72	-0.16	-2.31	-3.22	-4.29	-5.37	-5.56
VH	-6.83	-6.28	-8.21	-7.82	-11.28	-9.49	-10.81

DATE- MAY 15, 1977 SITE- 1 LOOK- 5

VV	4.17	-2.77	-4.00	-4.75	-4.37	-4.24	-4.07
VH	-1.64	-9.19	-8.08	-8.77	-9.99	-8.80	-9.51

DATE- MAY 17, 1977 SITE- 2 LOOK- 1

VV	-11.15	-11.97	-14.80	-17.66	-19.36	-20.41	-23.53
VH	-8.54	-12.18	-16.61	-15.14	-17.98	-18.77	-21.72

DATE- MAY 17, 1977 SITE- 2 LOOK- 2

VV	-1.54	-10.78	-16.17	-14.43	-16.47	-19.02	-17.33
VH	99.00	99.00	99.00	99.00	99.00	99.00	99.00

ANGLE 10 20 30 40 50 60 70

DATE- MAY 17, 1977 SITE- 2 LOOK- 3

VV	-1.98	-7.96	-9.90	-12.85	-14.03	-15.05	-17.25
VH	-6.46	-10.24	-15.38	-17.04	-17.67	-18.34	-18.74

DATE- MAY 18, 1977 SITE- 2 LOOK- 4

VV	-6.47	-16.64	-16.27	-17.37	-17.53	-19.59	-22.25
VH	-8.99	-15.28	-22.18	-22.16	-21.11	-21.45	-24.04

DATE- MAY 18, 1977 SITE- 2 LOOK- 5

VV	-14.92	-15.53	-17.22	-17.64	-19.23	-19.85	-22.05
VH	-15.79	-16.51	-18.85	-20.01	-22.27	-22.58	-24.03

DATE- MAY 18, 1977 SITE- 2 LOOK- 6

VV	-4.01	-7.39	-11.46	-14.50	-16.08	-16.77	-16.89
VH	99.00	99.00	99.00	99.00	99.00	99.00	99.00

DATE- MAY 19, 1977 SITE- 3 LOOK- 1

VV	-6.25	-13.14	-13.90	-14.99	-13.43	-14.32	-14.65
VH	-7.56	-13.65	-16.38	-16.47	-15.81	-18.23	-17.27

DATE- MAY 19, 1977 SITE- 3 LOOK- 2

VV	-4.54	-11.23	-8.86	-11.78	-15.51	-13.90	-15.67
VH	-4.34	-12.07	-14.40	-16.53	-16.56	-17.00	-16.98

DATE- MAY 20, 1977 SITE- 3 LOOK- 3

VV	-6.27	-10.32	-16.02	-19.44	-21.06	-22.33	-24.13
VH	-6.83	-9.03	-13.73	-14.36	-15.96	-16.24	-15.21

ANGLE 10 20 30 40 50 60 70

DATE- MAY 20, 1977 SITE- 3 LOOK- 4

VV -7.98 -15.91 -16.50 -18.55 -21.15 -22.47 -24.02
VH -10.07 -13.75 -19.13 -18.85 -22.55 -21.85 -22.33

DATE- MAY 20, 1977 SITE- 3 LOOK- 5

VV -7.05 -6.78 -15.60 -21.25 -20.76 -20.77 -23.28
VH -9.66 -13.64 -19.30 -21.30 -22.42 -22.81 -22.48

DATE- MAY 21, 1977 SITE- 3 LOOK- 6

VV -4.87 -11.24 -19.24 -18.42 -19.41 -21.68 -23.12
VH -8.92 -19.18 -19.85 -22.16 -23.21 -23.02 -23.51

DATE- MAY 21, 1977 SITE- 4 LOOK- 1

VV -3.60 -3.75 -4.17 -9.97 -15.03 -15.63 -20.13
VH -9.02 -9.47 -8.95 -12.40 -18.09 -22.09 -21.45

DATE- MAY 22, 1977 SITE- 4 LOOK- 2

VV -0.33 -3.19 -4.86 -5.17 -10.99 -11.86 -15.62
VH -5.84 -7.12 -10.88 -12.34 -16.90 -17.22 -18.68

DATE- MAY 22, 1977 SITE- 5 LOOK- 1

VV -10.07 -11.56 -14.95 -16.43 -19.82 -19.04 -23.45
VH -13.08 -16.56 -20.23 -20.62 -23.15 -23.27 -27.22

ANGLE 10 20 30 40 50 60 70

DATE- MAY 23, 1977 SITE- 5 LOOK- 2

VV	-6.35	-13.09	-13.90	-16.83	-18.09	-19.76	-23.32
VH	-13.07	-18.57	-16.63	-19.37	-23.45	-23.94	-25.69

DATE- MAY 23, 1977 SITE- 5 LOOK- 3

VV	-4.57	-12.80	-17.39	-22.87	-23.08	-21.16	-21.77
VH	-9.93	-17.19	-21.04	-20.77	-24.68	-25.60	-23.08

DATE- MAY 23, 1977 SITE- 5 LOOK- 4

VV	-10.63	-11.19	-16.14	-18.80	-20.80	-21.70	-23.49
VH	-14.98	-16.41	-19.35	-21.14	-23.91	-26.30	-27.14

DATE- MAY 23, 1977 SITE- 5 LOOK- 5

VV	-9.71	-12.89	-13.68	-17.22	-17.91	-20.62	-24.50
VH	-11.20	-16.25	-19.49	-19.82	-21.77	-23.09	-24.10

DATE- MAY 23, 1977 SITE- 5 LOOK- 6

VV	-6.37	-12.28	-14.02	-12.28	-16.63	-19.63	-22.61
VH	-13.30	-16.72	-16.47	-18.08	-24.32	-25.30	-25.14

DATE- MAY 25, 1977 SITE- 6 LOOK- 1

VV	-14.08	-15.03	-22.67	-22.97	-25.26	-24.79	-24.64
VH	-15.07	-18.91	-25.45	-25.50	-27.82	-26.99	-27.64

DATE- MAY 25, 1977 SITE- 6 LOOK- 2

VV	-13.98	-14.22	-24.06	-25.68	-24.92	-25.37	-25.03
VH	-14.43	-21.22	-25.87	-26.75	-27.02	-27.89	-29.91

ANGLE 10 20 30 40 50 60 70

DATE- MAY 26, 1977 SITE- 6 LOOK- 3

VV -13.98 -16.99 -22.98 -25.32 -24.64 -26.57 -27.46
VH -15.45 -23.03 -25.46 -26.87 -27.69 -27.54 -28.61

DATE- MAY 26, 1977 SITE- 6 LOOK- 4

VV -11.64 -16.66 -23.75 -23.04 -26.09 -26.77 -27.34
VH -12.77 -21.54 -25.78 -25.06 -27.51 -29.08 -26.83

DATE- MAY 26, 1977 SITE- 6 LOOK- 5

VV -12.58 -17.66 -21.91 -24.25 -24.56 -25.34 -24.23
VH -15.48 -23.87 -25.84 -26.90 -27.88 -27.48 -27.83

DATE- MAY 28, 1977 SITE- 7 LOOK- 1

VV -12.60 -16.25 -20.61 -22.57 -24.90 -28.20 -28.80
VH -16.54 -19.51 -22.43 -26.55 -28.63 -29.41 -31.25

DATE- MAY 28, 1977 SITE- 7 LOOK- 2

VV -14.71 -16.01 -22.90 -26.18 -27.95 -28.79 -29.76
VH -21.01 -18.41 -25.47 -28.06 -28.33 -29.07 -30.08

DATE- MAY 28, 1977 SITE- 7 LOOK- 3

VV -12.77 -15.46 -22.07 -26.40 -26.01 -27.46 -27.64
VH -14.73 -20.37 -25.89 -27.25 -28.42 -27.34 -27.24

SEA ICE DATA SPRING 1977 EXPERIMENT
GROUND SYSTEM KUX-BAND RADAR CROSS SECTIONS
POINT BARROW, ALASKA

Average σ° for Thick First Year Ice
(Sites #1 and #3)

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-10.01	-9.21	-7.48	-5.01	-5.51	-6.11	-10.99	-6.46	-7.25
20	-14.88	-13.45	-10.95	-9.76	-7.60	-9.07	-12.01	-9.71	-7.44
30	-15.98	-14.57	-11.32	-11.44	-12.46	-12.19	-15.50	-10.20	-12.87
40	-17.50	-14.97	-14.62	-12.75	-12.32	-12.80	-15.10	-11.86	-10.52
50	-16.97	-18.14	-13.54	-12.99	-12.83	-14.74	-16.01	-14.10	-13.96
60	-19.83	-19.16	-17.56	-16.22	-15.18	-15.60	-20.83	-17.65	-17.93
70	-23.71	-23.97	-22.54	-21.12	-20.37	-20.77	-23.41	-24.04	-23.74
HV ANGLE									
10	-24.76	-26.11	-22.12	-23.45	-23.36	-22.70	-21.77	-19.97	-19.09
20	-27.42	-28.86	-25.91	-26.15	-26.07	-20.59	-24.82	-21.20	-20.71
30	-31.19	-31.27	-23.93	-27.17	-27.42	-26.99	-26.60	-23.17	-20.90
40	-34.24	-32.41	-27.63	-28.87	-28.16	-26.98	-24.98	-23.89	-21.09
50	-36.72	-33.56	-29.81	-30.87	-28.31	-30.16	-28.45	-25.30	-20.79
60	-37.95	-37.07	-31.80	-31.49	-30.77	-30.33	-32.14	-25.85	-24.34
70	-41.67	-39.99	-34.93	-33.96	-34.03	-33.68	-33.80	-28.89	-25.95
VV ANGLE									
10	-9.01	-7.38	-5.64	-3.36	-3.26	-4.77	-5.84	-2.49	-3.08
20	-15.34	-11.80	-9.24	-10.16	-6.92	-6.78	-7.89	-5.14	-8.15
30	-17.29	-13.84	-11.38	-10.77	-11.75	-10.65	-10.46	-7.18	-11.33
40	-16.71	-14.90	-14.22	-11.76	-11.38	-10.74	-12.35	-8.16	-8.18
50	-18.14	-17.72	-15.19	-14.67	-12.85	-12.45	-14.32	-11.03	-15.99
60	-21.24	-20.17	-17.23	-16.07	-15.44	-15.29	-16.02	-12.59	-16.28
70	-25.17	-24.52	-21.59	-21.14	-19.31	-18.74	-17.98	-20.01	-20.56
VH ANGLE									
10	-26.13	-31.74	-20.52	-24.65	-22.48	-24.77	-24.83	-21.17	-19.27
20	-31.18	-29.18	-21.82	-26.61	-26.64	-21.65	-26.90	-21.31	-16.99
30	-31.64	-32.56	-23.62	-26.23	-28.00	-27.40	-28.93	-22.11	-18.04
40	-33.60	-31.17	-24.13	-28.10	-28.98	-27.01	-25.69	-23.61	-20.76
50	-35.57	-33.71	-29.77	-30.23	-27.80	-30.14	-28.83	-23.59	-20.22
60	-38.57	-37.24	-31.83	-30.66	-31.32	-31.01	-32.48	-24.38	-20.49
70	-42.27	-40.49	-35.29	-33.31	-35.43	-34.76	-34.53	-27.73	-23.50

Average σ^0 for Multiyear Sea Ice
(Sites #2 and #5)

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-2.42	-3.74	-2.30	-0.60	-1.91	-2.25	-3.22	-2.39	-1.17
20	-5.12	-4.18	-5.20	-2.49	-2.12	-2.80	-4.75	-2.77	-2.72
30	-7.56	-6.12	-5.58	-4.92	-4.19	-4.65	-4.30	-5.26	-5.92
40	-9.70	-8.17	-7.58	-5.94	-6.80	-6.05	-6.42	-7.04	-6.59
50	-12.16	-10.97	-9.75	-8.22	-7.22	-8.82	-8.09	-8.37	-10.25
60	-14.75	-13.53	-11.71	-11.96	-10.13	-10.74	-10.88	-10.64	-11.73
70	-19.27	-17.56	-16.55	-16.12	-14.82	-16.01	-14.60	-15.84	-14.78
HV ANGLE									
10	-16.95	-14.42	-13.90	-13.27	-12.53	-12.98	-10.98	-10.14	-9.04
20	-16.98	-14.53	-14.23	-14.60	-13.42	-12.62	-11.43	-11.02	-9.58
30	-17.89	-15.23	-15.28	-15.33	-14.20	-13.91	-11.64	-11.76	-11.26
40	-19.03	-17.06	-17.30	-16.31	-14.74	-14.16	-13.30	-13.05	-13.00
50	-21.06	-19.42	-17.79	-17.72	-16.81	-16.81	-15.26	-13.46	-13.83
60	-23.28	-20.58	-21.10	-19.79	-19.26	-19.06	-16.71	-15.79	-15.58
70	-26.70	-23.01	-23.13	-23.96	-23.51	-23.57	-21.17	-21.14	-15.34
VV ANGLE									
10	-0.41	-1.22	-0.98	2.06	0.32	0.15	-1.32	0.83	0.89
20	-2.76	-2.23	-3.14	-0.96	0.33	-0.76	-3.21	0.17	-1.42
30	-5.40	-3.62	-3.73	-2.46	-1.79	-2.26	-1.06	-1.33	-2.48
40	-6.63	-6.45	-5.69	-3.98	-3.92	-4.79	-4.54	-2.94	-3.23
50	-9.29	-7.67	-8.51	-5.90	-4.90	-6.70	-5.44	-6.19	-7.19
60	-12.56	-10.73	-9.69	-8.48	-8.14	-9.04	-9.07	-7.80	-8.81
70	-15.87	-14.72	-15.00	-13.20	-13.55	-13.47	-13.24	-12.27	-12.10
VH ANGLE									
10	-14.36	-13.92	-13.91	-14.61	-12.78	-12.37	-10.63	-10.76	-5.47
20	-15.67	-14.13	-14.22	-14.69	-14.16	-11.84	-11.46	-11.63	-4.57
30	-16.99	-15.81	-14.02	-15.19	-14.23	-14.30	-11.52	-11.49	-6.06
40	-17.57	-16.46	-16.00	-16.08	-14.08	-14.43	-14.25	-12.80	-8.03
50	-19.35	-18.73	-17.16	-17.70	-17.07	-16.10	-15.71	-13.48	-14.62
60	-21.74	-20.63	-20.05	-20.54	-19.68	-18.89	-18.07	-16.76	-16.96
70	-25.48	-24.31	-22.42	-23.33	-22.76	-22.35	-21.40	-20.75	-22.22

Average σ° for Site #1
Thick First Year Ice

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-15.64	-15.74	-12.45	-10.32	-10.36	-10.05	-10.30	-6.39	-6.03
20	-15.07	-13.54	-12.42	-8.60	-9.18	-10.69	-13.44	-8.30	-5.71
30	-14.79	-14.63	-10.55	-11.76	-10.95	-10.36	-15.53	-8.06	-12.42
40	-16.06	-12.39	-12.88	-10.53	-10.72	-10.83	-13.86	-9.55	-7.45
50	-14.47	-16.00	-10.39	-9.96	-10.76	-13.08	-16.07	-15.06	-11.78
60	-17.05	-16.45	-16.07	-13.94	-14.03	-13.98	-20.06	-16.14	-16.29
70	-20.81	-22.17	-21.04	-18.68	-19.35	-19.16	-22.53	-27.04	-26.72
HV ANGLE									
10	-22.34	-23.93	-20.80	-33.53	-30.82	-29.97	-31.66	-20.86	-17.71
20	-25.32	-35.44	-30.29	-37.38	-31.92	-17.99	-31.95	-19.14	-21.25
30	-36.00	-33.42	-21.58	-35.57	-31.87	-31.63	-33.71	-22.14	-20.82
40	-36.43	-37.12	-30.30	-36.12	-33.21	-32.89	-31.14	-22.55	-19.74
50	-37.99	-37.05	-31.10	-36.50	-32.21	-33.55	-33.61	-23.54	-19.06
60	-39.77	-39.30	-31.81	-37.84	-36.45	-34.99	-35.74	-24.62	-25.00
70	-41.68	-40.52	-33.39	-37.55	-33.50	-32.86	-34.62	-27.28	-24.26
VV ANGLE									
10	-16.60	-18.19	-12.89	-8.01	-7.50	-11.52	-8.99	-2.97	-6.60
20	-19.06	-15.12	-12.07	-11.43	-8.85	-8.55	-11.26	-4.71	-17.44
30	-19.60	-15.01	-11.50	-13.98	-11.54	-10.39	-10.86	-5.31	-17.94
40	-16.69	-13.67	-13.17	-12.09	-10.05	-11.54	-12.42	-6.92	-5.92
50	-17.00	-16.70	-12.77	-14.16	-11.30	-11.40	-13.44	-9.56	-18.46
60	-20.30	-18.94	-16.10	-16.42	-14.76	-14.81	-15.27	-10.62	-21.97
70	-23.93	-23.85	-20.79	-20.46	-18.55	-18.13	-16.39	-23.31	-21.99
VH ANGLE									
10	-24.60	-34.20	-21.93	-34.18	-31.60	-30.76	-32.04	-23.61	-19.01
20	-35.11	-35.35	-20.30	-35.49	-34.49	-19.47	-33.04	-20.00	-14.63
30	-35.92	-35.22	-21.35	-37.04	-32.33	-31.55	-32.96	-20.11	-15.37
40	-37.60	-38.37	-22.27	-37.07	-33.85	-33.54	-30.41	-22.71	-18.47
50	-39.55	-38.74	-30.99	-38.19	-34.59	-35.37	-35.23	-21.37	-17.23
60	-41.88	-41.16	-31.92	-40.17	-38.81	-38.12	-36.57	-22.38	-17.42
70	-46.62	-42.12	-33.82	-41.30	-37.21	-35.80	-35.89	-25.13	-20.28

Average σ° for Site #2
Multiyear Ice

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-2.69	-4.24	-1.91	-0.96	-2.32	-1.81	-2.27	-3.22	-2.95
20	-5.70	-4.53	-5.56	-2.91	-3.86	-2.61	-3.88	-3.82	-5.24
30	-7.93	-7.68	-5.48	-5.99	-4.79	-5.67	-6.22	-7.73	-9.16
40	-10.20	-9.14	-9.25	-6.19	-8.23	-7.26	-6.11	-7.93	-10.08
50	-12.96	-11.74	-10.69	-8.90	-8.67	-8.51	-8.07	-9.34	-12.60
60	-16.18	-13.87	-14.31	-13.43	-11.69	-10.59	-10.12	-12.49	-14.61
70	-21.38	-18.52	-17.89	-16.42	-15.51	-16.86	-13.80	-16.44	-16.00
HV ANGLE									
10	-18.26	-15.07	-14.95	-15.75	-13.38	-15.92	-15.11	-14.07	-13.66
20	-17.89	-17.60	-16.34	-17.15	-17.25	-17.95	-13.84	-14.30	-14.05
30	-21.28	-17.32	-16.59	-19.48	-17.10	-18.22	-15.33	-17.51	-18.53
40	-20.78	-18.85	-18.32	-18.34	-17.67	-18.47	-17.81	-16.99	-20.39
50	-23.21	-20.85	-20.09	-21.63	-19.08	-20.64	-18.63	-19.34	-17.36
60	-25.60	-24.27	-22.72	-23.55	-22.84	-23.84	-20.60	-21.40	-17.82
70	-30.35	-27.28	-26.78	-28.12	-25.96	-28.18	-24.49	-26.48	-13.67
VV ANGLE									
10	-1.16	-2.94	-1.24	-1.30	-2.83	-5.49	-5.49	-2.72	-6.46
20	-4.50	-3.10	-4.65	-2.73	-3.42	-4.68	-7.02	-3.31	-8.36
30	-6.94	-5.40	-4.35	-4.96	-4.21	-6.73	-8.96	-5.96	-6.48
40	-8.62	-8.21	-8.95	-4.72	-6.80	-8.45	-9.44	-5.43	-10.30
50	-12.55	-9.73	-9.87	-9.72	-9.59	-8.78	-11.06	-10.75	-10.90
60	-14.76	-13.22	-13.95	-12.61	-11.34	-11.97	-13.55	-11.91	-13.15
70	-18.95	-17.63	-18.19	-15.63	-16.48	-17.74	-18.00	-16.93	-14.75
VH ANGLE									
10	-16.49	-15.54	-15.20	-15.92	-13.11	-15.62	-16.70	-15.14	-3.98
20	-17.64	-16.60	-16.03	-18.61	-16.79	-14.45	-14.87	-16.52	-2.87
30	-20.57	-17.35	-15.02	-18.71	-16.45	-19.77	-17.40	-20.14	-4.01
40	-20.28	-19.67	-17.77	-18.93	-16.48	-18.35	-19.81	-17.80	-6.34
50	-22.32	-21.41	-19.83	-21.63	-19.09	-21.47	-20.22	-21.31	-20.93
60	-25.80	-24.36	-21.63	-23.42	-22.82	-25.05	-21.93	-23.60	-22.37
70	-30.60	-27.51	-25.14	-28.48	-26.13	-28.65	-26.70	-27.75	-25.23

Average σ° for Site #3
Thick First Year Ice

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-8.12	-7.22	-5.69	-3.16	-3.74	-4.51	-11.60	-6.52	-8.45
20	-14.74	-13.39	-10.11	-10.90	-6.70	-8.16	-11.18	-11.18	-9.42
30	-17.16	-14.52	-12.00	-11.22	-14.08	-14.37	-15.48	-13.01	-13.24
40	-19.01	-19.05	-16.62	-15.76	-14.08	-15.23	-16.34	-15.12	-16.93
50	-20.76	-20.97	-20.55	-19.10	-15.48	-16.60	-15.96	-13.50	-16.87
60	-24.67	-23.70	-19.16	-19.40	-16.31	-17.40	-21.51	-19.28	-19.75
70	-29.15	-26.08	-24.15	-24.72	-21.33	-22.55	-24.21	-22.66	-22.36
HV ANGLE									
10	-28.30	-29.04	-23.46	-21.21	-21.28	-20.63	-19.53	-19.40	-20.52
20	-30.16	-26.86	-24.22	-23.86	-24.15	-24.75	-22.77	-23.84	-20.35
30	-29.42	-30.15	-27.27	-25.02	-25.71	-25.25	-24.55	-24.15	-20.96
40	-33.11	-30.66	-26.34	-26.80	-26.35	-25.05	-23.03	-25.26	-22.48
50	-35.96	-32.05	-29.05	-28.98	-26.71	-28.68	-26.63	-27.35	-22.78
60	-36.96	-35.92	-31.79	-29.51	-28.88	-28.59	-30.61	-27.08	-23.90
70	-41.67	-39.63	-36.61	-32.43	-34.47	-34.41	-33.28	-30.67	-27.87
VV ANGLE									
10	-6.92	-5.11	-3.57	-1.62	-1.60	-2.75	-4.42	-2.17	-1.57
20	-13.78	-10.34	-7.91	-9.41	-5.88	-5.81	-6.42	-5.49	-5.94
30	-16.12	-13.13	-11.29	-9.33	-11.92	-10.86	-10.19	-9.42	-9.33
40	-16.73	-16.12	-15.21	-11.52	-12.73	-10.23	-12.29	-9.40	-11.28
50	-19.24	-18.68	-18.76	-15.09	-14.53	-13.45	-15.12	-12.58	-14.77
60	-22.11	-21.40	-18.32	-15.83	-16.03	-15.68	-16.68	-15.02	-14.38
70	-26.40	-25.10	-22.31	-21.74	-19.98	-19.26	-19.74	-18.55	-19.73
VH ANGLE									
10	-27.79	-30.52	-19.70	-22.43	-20.28	-22.84	-22.77	-19.95	-19.48
20	-29.58	-27.22	-23.47	-24.43	-24.53	-24.57	-24.95	-22.65	-20.38
30	-29.97	-31.28	-26.76	-23.96	-26.32	-25.75	-27.30	-24.62	-22.46
40	-31.98	-29.11	-26.36	-25.91	-27.20	-25.02	-23.94	-24.44	-23.96
50	-33.96	-31.91	-29.04	-28.11	-25.78	-28.31	-26.85	-26.62	-26.10
60	-37.11	-35.64	-31.76	-28.44	-29.24	-28.96	-30.84	-26.88	-26.91
70	-40.58	-39.57	-36.86	-31.19	-34.45	-34.11	-33.73	-31.87	-31.07

Average σ° for Site #4
Pressure Ridge

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-3.48	-3.95	1.53	1.41	1.41	-4.27	-3.24	-4.23	-4.34
20	-9.92	-7.78	-5.81	-6.60	-3.21	-7.60	-8.76	-8.84	-7.59
30	-12.49	-10.56	-9.96	-9.52	-6.58	-11.00	-11.96	-10.50	-13.50
40	-14.21	-14.30	-9.71	-10.91	-10.38	-11.36	-12.56	-14.58	-14.14
50	-16.00	-14.39	-12.41	-11.77	-12.24	-12.60	-15.36	-16.65	-13.82
60	-16.91	-19.93	-16.75	-15.00	-14.61	-15.76	-15.27	-18.92	-15.76
70	-24.86	-22.57	-21.00	-21.60	-21.64	-23.53	-23.09	-23.86	-22.01
HV ANGLE									
10	-19.76	-17.08	-14.10	-14.24	-12.52	-12.30	-9.66	-12.85	-10.41
20	-19.73	-17.08	-16.11	-19.28	-14.57	-15.62	-15.85	-15.88	-13.09
30	-22.52	-21.97	-18.86	-19.33	-17.60	-17.26	-24.06	-21.06	-18.74
40	-22.77	-21.82	-21.00	-20.75	-18.61	-18.11	-18.29	-20.09	-18.54
50	-26.40	-24.47	-22.49	-22.42	-21.05	-19.88	-21.11	-19.43	-17.56
60	-28.10	-26.99	-24.24	-25.61	-22.47	-22.90	-21.47	-22.79	-22.11
70	-35.38	-35.05	-31.91	-33.87	-33.74	-32.28	-33.57	-32.01	-26.69
VV ANGLE									
10	-2.18	-2.78	2.48	2.15	4.34	3.73	-1.26	1.75	1.19
20	-7.68	-7.20	-4.47	-4.49	-3.03	-5.05	-4.24	-3.48	-3.25
30	-9.37	-9.39	-8.89	-6.07	-4.52	-6.89	-6.90	-7.62	-7.06
40	-11.94	-13.09	-9.71	-9.00	-8.32	-7.29	-8.24	-9.72	-9.55
50	-14.67	-13.87	-12.32	-10.02	-9.86	-11.59	-12.24	-12.87	-12.57
60	-18.79	-19.65	-17.53	-14.74	-11.89	-13.96	-15.13	-15.61	-13.28
70	-25.20	-23.50	-23.12	-21.11	-22.18	-24.13	-23.30	-23.71	-22.45
VH ANGLE									
10	-19.35	-17.84	-13.31	-14.45	-9.60	-12.07	-11.73	-10.69	-11.38
20	-19.85	-16.50	-15.55	-18.87	-14.92	-15.92	-14.79	-15.10	-13.59
30	-22.01	-20.78	-19.24	-19.34	-16.33	-19.39	-21.45	-19.61	-17.10
40	-22.09	-20.14	-19.88	-21.55	-17.98	-16.88	-18.95	-18.34	-18.24
50	-25.89	-23.57	-21.59	-21.18	-20.74	-20.52	-21.69	-18.50	-20.28
60	-25.59	-27.70	-24.01	-25.65	-23.04	-24.18	-22.67	-21.09	-22.47
70	-34.12	-33.51	-31.18	-31.77	-32.84	-32.54	-32.48	-29.39	-29.89

Average σ^0 for Site #5
Multiyear Ice

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-2.17	-3.30	-2.72	-0.26	-1.54	-2.75	-4.45	-1.70	0.09
20	-4.61	-3.85	-4.87	-2.10	-0.88	-3.00	-5.84	-1.93	-1.14
30	-7.21	-4.98	-5.69	-4.07	-3.67	-3.83	-2.97	-3.70	-4.09
40	-9.26	-7.38	-6.37	-5.70	-5.73	-5.10	-6.75	-6.30	-4.68
50	-11.49	-10.31	-8.97	-7.63	-6.13	-9.15	-8.12	-7.57	-8.73
60	-13.67	-13.22	-10.09	-10.87	-8.98	-10.90	-11.81	-9.35	-10.02
70	-17.85	-16.77	-15.52	-15.84	-14.23	-15.30	-15.59	-15.32	-13.83
HV ANGLE									
10	-15.95	-13.86	-13.06	-11.70	-11.82	-11.24	-8.90	-8.11	-6.85
20	-16.22	-12.75	-12.82	-13.00	-11.42	-10.30	-9.89	-9.17	-7.42
30	-16.01	-13.83	-14.28	-13.25	-12.48	-11.79	-9.67	-9.37	-8.68
40	-17.79	-15.79	-16.47	-14.93	-13.00	-12.04	-11.13	-11.02	-10.40
50	-19.63	-18.34	-16.30	-15.70	-15.32	-14.81	-13.39	-11.05	-11.91
60	-21.77	-18.61	-19.93	-17.80	-17.32	-16.84	-14.69	-13.42	-14.11
70	-24.74	-20.90	-21.18	-21.87	-21.95	-21.38	-19.31	-18.82	-18.09
VV ANGLE									
10	0.23	0.01	-0.74	3.93	2.12	2.52	0.77	2.76	3.48
20	-1.52	-1.51	-2.02	0.30	2.31	1.27	-1.21	2.08	1.13
30	-4.27	-2.36	-3.19	-0.89	-0.25	-0.11	1.58	0.86	-0.43
40	-5.27	-5.20	-3.85	-3.34	-2.21	-2.83	-2.30	-1.37	-0.67
50	-7.45	-6.28	-7.47	-3.90	-2.70	-5.30	-3.07	-4.02	-5.22
60	-11.10	-9.16	-7.58	-6.40	-6.32	-7.31	-6.91	-5.73	-6.68
70	-14.09	-12.99	-13.18	-11.65	-11.82	-11.36	-11.02	-10.08	-10.46
VH ANGLE									
10	-12.93	-12.75	-12.91	-13.60	-12.47	-10.53	-8.19	-8.63	-7.75
20	-14.32	-12.56	-12.95	-12.66	-12.53	-10.22	-9.58	-9.39	-7.39
30	-15.05	-14.67	-13.21	-13.27	-12.77	-11.95	-9.11	-8.79	-10.10
40	-15.91	-14.63	-14.74	-14.37	-12.55	-12.41	-11.89	-10.54	-10.84
50	-17.60	-17.08	-15.52	-15.67	-15.70	-13.77	-13.54	-10.84	-12.15
60	-19.68	-18.65	-18.90	-18.83	-17.88	-16.44	-16.06	-14.22	-14.62
70	-23.20	-22.49	-20.76	-21.04	-20.89	-19.88	-19.08	-18.20	-20.46

Average σ^0 for Site #6
Lake Ice

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-17.09	-12.91	-14.85	-15.60	-12.55	-13.10	-12.73	-14.75	-15.37
20	-19.99	-18.48	-17.76	-17.99	-15.11	-18.72	-15.62	-15.77	-17.44
30	-22.16	-20.74	-19.52	-19.30	-17.48	-18.16	-17.04	-17.51	-19.06
40	-22.88	-21.76	-21.36	-18.92	-20.02	-20.03	-20.17	-19.69	-21.97
50	-25.19	-23.87	-23.43	-22.28	-21.94	-22.92	-22.13	-21.82	-23.46
60	-28.69	-26.80	-27.41	-25.14	-25.36	-25.77	-25.54	-24.91	-24.88
70	-32.10	-31.07	-31.72	-30.49	-30.07	-30.86	-30.67	-29.08	-29.55
HV ANGLE									
10	-27.78	-27.06	-26.03	-26.82	-27.27	-25.76	-24.30	-22.53	-21.99
20	-28.34	-25.52	-27.74	-26.76	-28.28	-26.46	-24.95	-23.06	-22.28
30	-29.46	-26.09	-28.73	-26.73	-28.95	-28.47	-24.93	-23.91	-24.85
40	-30.56	-29.76	-30.50	-28.10	-29.37	-29.43	-26.86	-25.60	-25.51
50	-32.19	-30.77	-32.71	-30.37	-30.09	-30.49	-28.82	-27.25	-28.26
60	-33.97	-33.85	-33.64	-31.05	-34.00	-35.09	-31.41	-28.49	-30.08
70	-37.65	-36.35	-37.47	-33.89	-38.18	-38.18	-35.40	-32.66	-33.97
VV ANGLE									
10	-14.35	-11.17	-15.41	-13.66	-10.87	-8.90	-9.35	-11.53	-11.05
20	-18.43	-17.47	-16.71	-14.24	-13.29	-14.49	-10.62	-12.51	-14.26
30	-19.52	-17.75	-19.15	-16.44	-16.99	-18.32	-12.20	-15.87	-16.56
40	-20.08	-18.76	-19.87	-17.76	-20.39	-17.73	-17.43	-16.54	-18.54
50	-23.60	-21.22	-22.15	-20.26	-20.67	-20.37	-17.46	-17.20	-20.08
60	-25.65	-23.57	-25.41	-22.41	-22.47	-22.80	-21.68	-20.95	-23.18
70	-29.12	-27.82	-28.79	-25.83	-27.90	-25.74	-25.83	-25.30	-26.89
VH ANGLE									
10	-27.96	-25.85	-27.67	-25.35	-28.58	-26.57	-24.89	-24.15	-22.48
20	-27.91	-25.46	-27.34	-25.50	-30.12	-27.18	-26.18	-24.48	-23.08
30	-29.57	-27.08	-28.72	-26.24	-29.48	-29.69	-26.10	-25.46	-25.17
40	-31.33	-29.83	-31.00	-26.52	-30.75	-30.21	-26.92	-25.30	-25.03
50	-31.48	-30.14	-32.44	-27.85	-31.76	-30.91	-28.58	-27.75	-26.80
60	-34.45	-33.61	-33.57	-29.03	-33.82	-35.69	-30.63	-30.20	-28.76
70	-38.00	-36.50	-37.32	-30.99	-38.32	-38.40	-35.61	-33.59	-32.15

Average σ° for Site #7
Lake Ice

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-6.60	-7.13	-5.04	-2.78	-2.71	-1.92	-2.36	-2.15	-3.68
20	-10.03	-9.93	-8.98	-10.11	-8.22	-7.86	-9.98	-8.11	-9.94
30	-13.41	-14.07	-12.96	-9.79	-10.35	-10.10	-10.85	-11.45	-9.92
40	-14.19	-15.57	-13.76	-12.64	-12.55	-12.59	-15.71	-9.84	-11.10
50	-18.02	-16.70	-15.89	-15.57	-14.59	-12.96	-13.66	-13.42	-14.08
60	-19.28	-18.45	-15.13	-14.79	-16.34	-16.23	-16.16	-13.44	-15.15
70	-22.32	-20.52	-20.56	-17.99	-17.07	-18.77	-19.07	-17.42	-19.51

HV ANGLE									
10	-26.30	-23.73	-25.36	-26.08	-22.52	-18.48	-18.41	-17.25	-16.98
20	-27.95	-27.22	-26.25	-24.48	-25.31	-23.58	-19.65	-19.09	-18.50
30	-29.07	-26.77	-27.85	-25.83	-24.36	-24.32	-21.45	-20.04	-20.47
40	-29.64	-25.82	-26.68	-25.64	-26.40	-24.56	-23.46	-21.90	-22.51
50	-30.64	-29.00	-27.16	-27.66	-26.55	-25.58	-22.99	-21.94	-21.45
60	-30.81	-32.04	-30.66	-26.10	-27.55	-26.29	-24.74	-22.44	-23.82
70	-33.62	-33.66	-33.30	-29.28	-29.60	-28.68	-27.12	-26.83	-28.43

VV ANGLE									
10	-6.54	-5.60	-5.78	-2.86	-4.99	-4.01	-2.35	1.71	-1.50
20	-8.79	-9.61	-10.57	-12.62	-9.97	-5.83	-8.30	-3.63	-8.54
30	-14.77	-14.09	-16.70	-7.72	-10.44	-9.92	-8.15	-8.69	-7.91
40	-15.94	-16.55	-15.19	-13.18	-12.76	-11.20	-11.74	-9.45	-13.59
50	-18.93	-18.51	-19.80	-15.82	-12.95	-14.66	-12.76	-9.94	-12.35
60	-21.16	-20.71	-19.32	-17.20	-17.35	-16.74	-16.52	-14.41	-17.04
70	-23.26	-24.16	-24.57	-20.30	-19.85	-19.57	-17.76	-17.71	-18.97

VH ANGLE									
10	-26.50	-25.26	-23.33	-21.45	-20.72	-21.77	-17.91	-17.34	-16.91
20	-28.54	-28.79	-27.02	-21.69	-24.31	-23.55	-19.44	-19.03	-20.22
30	-29.88	-28.31	-28.68	-23.29	-26.89	-22.29	-22.48	-20.96	-20.67
40	-30.03	-26.46	-29.08	-23.02	-27.73	-25.91	-23.81	-22.62	-22.85
50	-31.26	-29.92	-28.53	-24.04	-27.22	-26.32	-22.90	-21.81	-21.83
60	-32.09	-32.26	-30.25	-24.13	-29.44	-26.64	-24.09	-23.71	-23.40
70	-33.45	-34.33	-33.93	-26.71	-30.85	-27.46	-26.44	-27.51	-27.83

DATE- MAY 14, 1977 SITE- 1 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-19.33	-20.12	-13.28	-12.23	-9.52	-19.97	-14.57	-4.92	-4.70
20	-24.03	-23.08	-20.84	-13.26	-11.13	-11.94	-15.17	-10.58	-8.65
30	-14.36	-17.49	-16.36	-13.14	-14.39	-15.63	-14.25	-7.34	-24.28
40	-19.01	-17.31	-19.12	-17.51	-17.30	-19.37	-19.79	-20.82	-22.30
50	-20.85	-20.24	-15.37	-19.14	-15.87	-15.36	-17.91	-25.66	-25.50
60	-20.95	-21.10	-19.14	-18.85	-22.22	-17.93	-18.08	-26.78	-24.12
70	-38.85	-38.68	-37.17	-36.37	-34.64	-22.09	-24.69	-28.09	-30.04

HV ANGLE

10	-19.34	-21.09	-18.42	-32.95	-34.35	-33.35	-33.77	-22.56	-23.20
20	-36.85	-34.62	-30.28	-38.16	-36.73	-37.68	-33.57	-20.23	-23.12
30	-38.73	-38.23	-30.64	-40.97	-34.88	-34.53	-35.67	-20.56	-21.48
40	-39.31	-39.29	-31.65	-38.47	-34.27	-35.98	-35.91	-20.17	-22.68
50	-40.98	-40.39	-31.35	-40.93	-36.06	-37.28	-35.14	-22.50	-20.26
60	-43.90	-42.60	-32.71	-41.95	-41.81	-37.82	-37.76	-24.13	-24.67
70	-39.52	-40.59	-35.24	-38.78	-36.90	-35.30	-34.23	-25.49	-29.64

VV ANGLE

10	-19.28	-19.08	-12.93	-10.01	-6.35	-15.20	-12.80	-5.29	-4.96
20	-15.83	-11.63	-9.56	-12.06	-7.48	-7.40	-14.94	-7.47	-19.84
30	-21.45	-15.93	-13.52	-14.09	-9.82	-11.84	-11.42	-7.68	-21.33
40	-17.24	-15.55	-16.34	-13.33	-12.51	-15.46	-14.75	-7.94	-17.84
50	-21.14	-18.81	-12.98	-17.22	-13.89	-13.51	-17.97	-23.17	-22.08
60	-21.13	-19.35	-17.22	-18.37	-17.64	-16.38	-16.77	-24.43	-22.30
70	-28.23	-26.06	-21.29	-23.27	-20.13	-18.38	-21.24	-24.70	-25.03

VH ANGLE

10	-20.26	-33.12	-17.73	-33.55	-34.50	-33.14	-34.48	-25.27	-15.90
20	-37.41	-34.72	-18.35	-38.62	-34.54	-35.69	-35.23	-24.27	-16.16
30	-37.36	-37.75	-29.51	-40.12	-34.11	-35.13	-34.67	-22.87	-16.86
40	-39.02	-40.22	-29.74	-38.47	-35.13	-35.79	-28.83	-22.66	-16.82
50	-40.78	-40.94	-30.82	-40.99	-35.98	-38.07	-37.01	-24.30	-16.99
60	-44.69	-41.61	-32.15	-42.39	-41.73	-39.39	-38.29	-26.56	-18.98
70	-47.96	-39.92	-33.72	-40.98	-38.12	-35.91	-34.65	-26.67	-21.33

DATE- MAY 14, 1977 SITE- 1 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-18.03	-13.51	-9.65	-7.47	-11.92	-11.52	-13.38	-9.50	-7.98
20	-10.98	-11.00	-10.71	-8.99	-7.38	-14.81	-13.50	-8.68	-7.07
30	-12.62	-15.86	-12.46	-11.40	-11.82	-6.54	-17.23	-9.55	-26.04
40	-14.80	-12.57	-11.47	-13.76	-10.18	-8.82	-10.89	-7.70	-6.08
50	-14.13	-15.78	-10.83	-9.50	-10.37	-13.41	-17.46	-21.20	-22.74
60	-17.65	-16.56	-15.14	-15.94	-14.27	-12.72	-30.83	-23.45	-25.69
70	-19.28	-19.94	-20.08	-19.69	-18.36	-17.66	-32.17	-26.49	-25.61

HV ANGLE

10	-22.52	-23.74	-20.11	-35.47	-28.55	-28.65	-36.46	-19.84	-14.39
20	-40.89	-42.02	-30.84	-42.05	-30.23	-33.67	-35.93	-19.99	-21.16
30	-35.38	-35.18	-31.40	-35.34	-32.26	-33.29	-34.61	-21.45	-20.47
40	-38.96	-38.59	-30.17	-36.80	-33.91	-33.40	-35.52	-23.28	-22.04
50	-38.22	-40.57	-31.51	-37.83	-31.60	-34.68	-37.30	-22.41	-18.36
60	-42.71	-39.71	-32.08	-39.29	-38.79	-34.69	-36.67	-23.07	-23.86
70	-44.65	-42.99	-33.54	-36.11	-31.19	-30.11	-33.18	-26.85	-24.52

VV ANGLE

10	-17.75	-21.38	-13.23	-8.81	-12.24	-12.67	-18.40	-4.21	-5.14
20	-23.11	-22.68	-20.01	-19.20	-15.42	-17.27	-15.72	-5.75	-17.20
30	-17.22	-18.82	-12.96	-15.88	-16.75	-15.55	-12.87	-5.75	-17.80
40	-16.41	-15.63	-12.94	-18.04	-10.08	-9.38	-13.07	-6.71	-5.32
50	-16.87	-20.56	-14.60	-14.11	-10.69	-8.99	-16.26	-8.60	-18.70
60	-21.06	-22.00	-17.11	-20.17	-16.55	-15.79	-17.65	-9.92	-23.05
70	-23.88	-25.57	-22.75	-24.55	-19.03	-18.11	-21.34	-24.36	-21.86

VH ANGLE

10	-31.87	-33.75	-30.22	-34.98	-29.23	-29.52	-32.27	-27.30	-25.85
20	-40.85	-40.29	-19.33	-33.36	-34.63	-33.03	-37.41	-20.47	-16.35
30	-36.14	-37.13	-30.45	-37.83	-31.62	-33.81	-34.71	-20.42	-18.09
40	-41.04	-40.84	-30.86	-39.21	-34.87	-33.00	-36.41	-20.87	-17.59
50	-40.24	-42.64	-32.50	-40.06	-35.15	-35.45	-38.40	-21.65	-17.19
60	-45.08	-43.28	-33.20	-42.57	-41.64	-38.59	-38.24	-22.93	-18.31
70	-47.31	-46.80	-35.13	-40.47	-34.99	-33.50	-35.08	-27.13	-20.24

DATE- MAY 14, 1977 SITE- 1 LOOK- 3

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-12.64	-15.91	-18.17	-14.00	-10.00	-6.65	-7.01	-5.94	-6.01
20	-20.18	-13.14	-11.05	-6.18	-9.88	-7.99	-12.16	-6.56	-3.25
30	-20.91	-12.25	-7.34	-11.01	-8.57	-15.70	-15.60	-7.60	-7.81
40	-15.43	-10.03	-11.49	-6.87	-8.56	-9.78	-15.04	-8.10	-5.42
50	-12.19	-14.04	-7.89	-7.48	-8.72	-11.38	-13.98	-10.79	-7.19
60	-14.69	-14.20	-15.04	-10.83	-11.24	-12.98	-18.79	-11.78	-11.94
70	-18.87	-21.01	-18.67	-15.28	-17.01	-18.82	-18.95	-26.72	-25.78
HV ANGLE									
10	-35.67	-38.52	-30.97	-32.67	-31.43	-29.24	-28.53	-20.61	-20.17
20	-20.69	-33.48	-29.81	-34.77	-31.15	-13.27	-29.13	-17.69	-20.01
30	-34.82	-30.41	-17.15	-33.38	-29.86	-29.06	-31.81	-26.26	-20.57
40	-33.58	-34.87	-29.37	-34.19	-31.86	-30.79	-27.52	-26.25	-16.95
50	-36.08	-33.85	-30.50	-33.70	-30.63	-30.98	-30.89	-27.18	-18.79
60	-36.54	-37.20	-30.85	-35.07	-33.17	-33.50	-33.79	-28.05	-27.07
70	-42.38	-38.90	-31.99	-38.23	-34.27	-35.49	-37.53	-31.39	-21.78
VV ANGLE									
10	-14.31	-15.87	-12.53	-6.15	-6.17	-8.96	-5.06	-0.76	-15.15
20	-22.04	-17.40	-11.84	-8.49	-7.37	-6.61	-7.81	-2.45	-16.07
30	-21.70	-12.51	-9.30	-12.59	-10.70	-7.42	-9.12	-3.51	-16.16
40	-16.46	-11.32	-11.52	-9.09	-8.46	-11.75	-10.51	-6.28	-3.39
50	-15.01	-13.75	-11.34	-12.42	-10.16	-13.30	-10.16	-7.23	-16.37
60	-19.04	-16.91	-14.53	-13.54	-12.15	-13.03	-12.93	-8.11	-20.85
70	-21.85	-21.48	-19.11	-17.26	-17.05	-17.92	-12.67	-21.59	-20.30
VH ANGLE									
10	-34.85	-36.36	-28.48	-34.13	-32.78	-30.38	-30.34	-20.84	-20.27
20	-31.80	-33.53	-27.75	-36.04	-34.30	-14.80	-29.97	-17.62	-12.53
30	-34.67	-32.67	-17.00	-34.80	-31.70	-28.61	-30.76	-18.24	-12.92
40	-34.99	-35.87	-17.99	-34.85	-32.20	-32.49	-29.23	-26.10	-23.49
50	-38.11	-35.75	-30.01	-35.57	-33.15	-33.67	-32.55	-19.46	-17.52
60	-38.87	-39.45	-30.75	-37.56	-35.87	-36.79	-34.41	-19.99	-15.69
70	-45.12	-42.13	-32.90	-42.79	-40.03	-40.63	-39.22	-22.91	-19.46

DATE- MAY 15, 1977 SITE- 1 LOOK-4

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-10.27	-9.98	-7.05	-12.18	-5.49	-9.22	-14.91	-12.30	-14.80
20	-15.86	-15.93	-16.69	-12.08	-12.65	-13.64	-14.00	-16.97	-25.57
30	-21.51	-18.21	-18.55	-14.98	-15.00	-16.89	-18.52	-17.22	-18.27
40	-20.73	-21.50	-17.22	-18.71	-18.74	-19.17	-16.33	-20.30	-22.52
50	-25.31	-22.22	-20.72	-22.63	-18.12	-18.83	-17.28	-18.70	-15.84
60	-27.27	-25.20	-25.51	-23.16	-20.03	-23.21	-21.51	-22.11	-21.37
70	-29.22	-30.64	-29.07	-26.72	-25.80	-26.21	-25.67	-26.91	-26.30
HV ANGLE									
10	-33.03	-31.75	-24.43	-28.20	-25.93	-22.64	-26.67	-27.66	-21.98
20	-31.30	-29.59	-27.45	-25.73	-24.97	-24.46	-22.88	-23.78	-21.91
30	-31.53	-28.41	-25.03	-28.56	-26.47	-27.39	-22.54	-22.66	-29.54
40	-30.41	-30.60	-25.00	-32.06	-30.74	-29.47	-25.20	-26.79	-27.98
50	-35.68	-35.07	-27.42	-32.34	-31.80	-33.17	-28.57	-28.93	-27.62
60	-36.57	-34.52	-27.87	-33.78	-32.94	-32.53	-34.05	-29.25	-27.62
70	-40.67	-38.22	-31.58	-37.43	-36.48	-37.15	-34.99	-31.56	-34.23
VV ANGLE									
10	-8.81	-6.03	-5.72	-8.93	-2.40	-5.69	-6.38	-8.39	-7.97
20	-14.76	-13.52	-16.10	-10.88	-10.92	-10.76	-9.16	-12.60	-15.51
30	-19.05	-16.20	-17.87	-12.52	-12.35	-12.88	-15.66	-12.74	-10.08
40	-19.40	-17.18	-16.95	-16.26	-14.98	-14.03	-12.09	-17.71	-19.48
50	-25.77	-20.65	-17.99	-22.32	-17.04	-15.00	-14.37	-18.05	-16.24
60	-24.25	-21.34	-22.09	-20.36	-18.73	-17.79	-18.20	-18.77	-16.03
70	-26.24	-26.30	-23.98	-24.97	-21.72	-22.28	-21.86	-21.23	-21.19
VH ANGLE									
10	-29.81	-28.26	-22.38	-28.76	-25.45	-24.61	-31.19	-31.50	-22.50
20	-31.32	-28.87	-24.14	-26.56	-25.06	-25.60	-24.36	-26.04	-23.59
30	-30.79	-28.59	-24.06	-28.25	-26.88	-26.63	-21.67	-25.60	-27.10
40	-31.52	-30.23	-24.08	-33.22	-32.51	-29.82	-23.96	-27.97	-27.60
50	-35.15	-35.18	-24.86	-31.97	-31.53	-34.05	-27.66	-30.17	-26.43
60	-36.95	-34.69	-26.13	-34.34	-32.93	-32.94	-31.89	-30.04	-27.98
70	-40.02	-39.65	-27.78	-37.80	-38.33	-37.22	-32.92	-32.82	-34.19

DATE- MAY 15, 1977 SITE- 1 LOOK- 5

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-9.31	-4.43	-1.82	-5.56	-1.29	-5.44	-8.50	-5.59	-11.60
20	-16.40	-11.85	-10.37	-11.27	-14.56	-12.44	-17.29	-15.59	-10.29
30	-14.45	-12.57	-11.77	-15.62	-12.06	-19.14	-16.81	-18.96	-24.67
40	-18.16	-20.47	-13.37	-16.67	-15.95	-15.36	-14.46	-17.84	-15.00
50	-20.23	-21.37	-20.08	-16.90	-16.29	-16.80	-17.55	-18.65	-17.80
60	-23.04	-21.52	-20.70	-22.11	-21.38	-18.80	-22.66	-20.33	-18.08
70	-27.20	-27.91	-24.99	-23.84	-23.53	-22.51	-25.27	-23.47	-24.36

HV ANGLE									
10	-27.17	-26.49	-26.87	-23.27	-27.00	-27.97	-23.18	-18.53	-19.79
20	-30.69	-25.91	-24.69	-27.84	-24.85	-26.08	-23.11	-23.42	-22.88
30	-28.65	-26.53	-27.37	-29.09	-25.54	-27.97	-29.22	-25.64	-26.35
40	-32.91	-30.61	-24.14	-29.20	-27.08	-25.86	-24.33	-23.89	-29.32
50	-34.52	-30.13	-27.11	-30.56	-25.02	-25.46	-25.35	-26.43	-26.08
60	-33.87	-33.40	-29.94	-33.12	-28.26	-29.91	-26.09	-27.44	-26.72
70	-38.86	-38.71	-32.33	-36.00	-32.39	-33.21	-30.54	-29.62	-32.90

VV ANGLE									
10	-6.37	-3.42	-2.81	-3.33	-0.35	2.40	-8.66	-1.70	-4.24
20	-13.62	-10.28	-10.42	-9.99	-11.29	-9.21	-11.80	-13.42	-6.64
30	-15.86	-11.70	-13.40	-11.92	-6.52	-15.40	-11.84	-11.46	-16.26
40	-19.07	-18.94	-13.43	-15.07	-11.43	-14.22	-15.35	-15.64	-14.12
50	-16.67	-18.49	-17.28	-14.80	-12.92	-12.32	-16.83	-12.52	-15.71
60	-24.34	-18.99	-21.58	-19.81	-16.99	-16.43	-14.49	-16.41	-15.90

VH ANGLE									
10	-23.52	-26.04	-23.79	-25.52	-23.36	-26.03	-25.06	-24.11	-26.22
20	-28.27	-24.59	-25.49	-31.84	-25.06	-29.36	-25.58	-27.85	-25.75
30	-31.41	-27.76	-26.44	-27.01	-26.03	-26.55	-26.75	-27.97	-28.81
40	-33.28	-33.43	-24.67	-29.57	-28.49	-27.84	-27.08	-25.23	-30.18
50	-34.02	-30.28	-27.38	-33.94	-28.04	-27.46	-27.91	-28.98	-28.01
60	-34.87	-34.16	-28.83	-34.41	-29.82	-30.37	-28.74	-31.97	-28.09
70	-40.05	-37.74	-30.85	-36.19	-34.29	-34.64	-32.53	-32.61	-34.58

DATE- MAY 17, 1977 SITE- 2 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-3.67	-2.89	2.19	-1.97	-5.12	-4.32	-0.24	-5.21	-2.40
20	-5.00	-3.00	-4.26	1.17	-1.00	2.09	-4.80	-2.46	-1.77
30	-10.87	-8.03	-4.96	-5.44	-5.17	-6.26	-9.09	-7.95	-5.82
40	-9.95	-10.07	-10.03	-8.88	-8.03	-7.50	-10.29	-5.60	-7.60
50	-10.69	-8.36	-11.85	-11.28	-7.84	-6.60	-8.75	-8.25	-10.28
60	-14.24	-13.78	-11.71	-11.40	-12.71	-9.04	-9.63	-10.54	-11.16
70	-19.92	-17.38	-17.09	-14.50	-16.62	-17.76	-15.79	-15.54	-13.08

HV ANGLE

10	-15.01	-15.15	-16.52	-14.46	-9.62	-19.11	-13.34	-13.99	-12.47
20	-13.07	-15.96	-14.98	-16.25	-17.24	-16.42	-10.58	-13.47	-10.27
30	-18.94	-14.96	-13.09	-18.91	-14.04	-18.13	-11.18	-13.30	-16.40
40	-18.74	-16.53	-17.15	-15.27	-16.86	-14.44	-18.19	-12.59	-18.90
50	-19.94	-20.22	-21.30	-21.63	-17.93	-17.91	-16.52	-17.44	-13.66
60	-23.20	-21.83	-19.56	-21.52	-20.40	-20.57	-17.20	-17.20	-13.81
70	-27.47	-24.13	-25.35	-29.01	-22.50	-26.29	-22.08	-22.70	-9.09

VV ANGLE

10	1.26	0.43	3.45	-1.67	-1.91	-8.36	-1.77	-1.48	-2.09
20	-3.09	-0.49	-3.23	-1.57	0.10	-2.61	-3.65	-0.39	-4.01
30	-9.40	-3.94	-3.24	-2.64	-2.68	-4.59	-9.55	-6.51	-2.23
40	-6.05	-6.78	-9.07	-6.35	-4.10	-6.39	-11.95	-2.08	-6.15
50	-9.67	-5.38	-8.66	-12.78	-10.92	-5.20	-9.97	-6.45	-8.56
60	-13.20	-11.64	-10.81	-9.48	-11.96	-9.08	-12.49	-8.63	-8.81
70	-15.87	-16.76	-17.36	-13.19	-12.91	-15.84	-15.59	-13.34	-10.39

VH ANGLE

10	-13.23	-13.37	-12.72	-14.48	-10.06	-15.42	-13.14	-10.63	0.67
20	-12.85	-15.30	-14.66	-19.08	-16.00	-8.98	-10.43	-17.81	1.84
30	-18.87	-14.53	-12.03	-15.48	-12.52	-15.31	-14.73	-17.54	0.70
40	-17.38	-17.65	-15.70	-15.22	-13.96	-16.04	-18.66	-13.74	-1.69
50	-18.37	-19.52	-20.22	-20.76	-17.40	-19.55	-15.93	-18.07	-19.12
60	-24.01	-22.51	-18.66	-20.77	-19.97	-21.99	-18.31	-20.73	-20.31
70	-27.80	-24.25	-24.05	-28.68	-22.47	-25.94	-24.48	-23.18	-22.71

DATE- MAY 17, 1977 SITE- 2 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	3.26	-5.41	-5.73	-0.78	0.27	-1.13	-2.88	0.21	-2.10
20	-3.18	-6.60	-6.42	-4.24	-4.80	-4.50	-4.78	-4.89	-8.39
30	-9.96	-8.93	-2.17	-5.84	-8.76	-7.64	-4.03	-8.16	-15.18
40	-8.78	-6.95	-11.96	-6.92	-4.86	-5.92	-4.40	-11.52	-16.00
50	-13.60	-10.12	-9.32	-6.07	-9.97	-7.52	-7.88	-7.47	-14.10
60	-14.06	-15.33	-17.06	-13.64	-8.83	-8.60	-9.37	-12.08	-19.55
70	-19.92	-16.88	-15.13	-14.27	-13.88	-15.43	-12.00	-14.57	-20.67
HV ANGLE									
10	-17.79	-13.13	-11.25	-14.02	-12.38	-11.67	-13.06	-12.54	-12.25
20	-19.79	-19.72	-13.44	-14.78	-18.94	-16.55	-15.46	-10.36	-20.24
30	-20.27	-17.12	-16.81	-18.14	-20.03	-17.22	-17.90	-18.42	-19.34
40	-19.81	-19.15	-17.29	-18.80	-15.95	-20.98	-15.41	-18.57	-22.37
50	-24.60	-18.64	-16.93	-20.92	-17.61	-18.92	-23.28	-22.85	-24.79
60	-24.14	-22.48	-21.41	-20.70	-20.12	-25.14	-23.42	-21.09	-23.90
70	-29.05	-25.29	-24.12	-24.08	-24.37	-29.71	-27.56	-28.93	-26.82
VV ANGLE									
10	2.20	-7.09	-7.62	-4.64	-1.44	-8.48	-4.99	1.14	-13.98
20	-2.13	-7.08	-3.83	-2.51	-3.21	-6.03	-7.79	-6.30	-17.49
30	-10.33	-5.73	-2.29	-5.72	-9.28	-8.79	-9.41	-7.56	-15.20
40	-8.05	-8.03	-11.49	-8.84	-5.65	-9.38	-7.21	-9.41	-19.55
50	-14.04	-12.08	-10.20	-7.34	-9.56	-9.39	-16.25	-11.95	-10.14
60	-12.91	-14.39	-13.38	-14.16	-9.40	-11.73	-11.36	-10.54	-21.64
70	-17.00	-14.67	-16.79	-12.85	-15.59	-14.94	-17.48	-16.58	-24.91
VH ANGLE									
10	-16.14	-14.80	-12.29	-13.53	-14.24	-16.17	-21.22	-19.21	-17.88
20	-19.20	-20.18	-15.46	-16.77	-19.30	-19.15	-18.35	-12.30	-20.30
30	-19.37	-18.37	-14.89	-23.66	-16.93	-21.43	-23.92	-20.38	-21.70
40	-18.92	-19.47	-17.02	-20.66	-15.25	-18.37	-18.16	-20.57	-22.60
50	-25.85	-20.06	-17.54	-20.90	-18.78	-20.86	-25.86	-26.02	-25.05
60	-24.63	-22.21	-20.02	-21.15	-22.00	-26.27	-23.17	-22.89	-24.28
70	-29.66	-26.56	-21.90	-24.56	-26.02	-29.90	-28.54	-30.22	-27.76

DATE- MAY 17, 1977 SITE- 2 LOOK- 3

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-6.46	-4.82	-0.71	1.19	-2.03	1.19	-2.90	-1.96	-4.85
20	-9.80	-2.06	-4.48	-1.66	-6.89	-10.26	-5.50	-0.26	-10.53
30	-3.84	-8.74	-6.18	-5.78	-1.86	-4.98	-5.66	-8.22	-11.46
40	-9.18	-10.03	-8.00	-1.13	-9.43	-6.75	-5.86	-5.64	-10.19
50	-11.89	-12.77	-9.94	-8.71	-7.29	-9.50	-7.38	-13.04	-14.91
60	-18.52	-13.76	-14.26	-13.85	-11.25	-13.17	-10.54	-12.51	-17.92
70	-25.59	-19.98	-19.05	-20.07	-19.95	-19.62	-16.98	-18.32	-17.55
HV ANGLE									
10	-22.18	-14.59	-15.61	-16.09	-13.64	-18.26	-15.27	-18.30	-18.86
20	-20.54	-17.26	-16.62	-18.08	-16.76	-20.58	-13.36	-15.12	-18.38
30	-22.23	-17.51	-18.17	-20.34	-19.04	-23.24	-18.49	-22.24	-21.23
40	-22.93	-21.08	-18.25	-19.06	-18.38	-19.50	-19.19	-18.42	-20.58
50	-23.34	-23.15	-21.87	-20.73	-18.93	-22.16	-22.05	-20.37	-20.62
60	-26.18	-26.22	-24.78	-25.08	-24.63	-25.69	-26.92	-26.91	-24.10
70	-32.56	-30.67	-28.49	-31.27	-29.09	-29.20	-28.18	-29.77	-24.69
VV ANGLE									
10	-2.91	-2.07	-1.57	-0.28	-1.53	-2.26	-7.71	-7.39	-17.07
20	-8.39	-2.88	-6.04	-1.20	-8.20	-11.79	-10.26	-0.43	-16.42
30	-2.91	-5.21	-6.12	-5.20	-2.18	-6.12	-8.32	-5.05	-13.34
40	-7.69	-8.97	-6.44	0.74	-7.26	-8.02	-7.39	-3.67	-15.85
50	-12.89	-11.53	-9.12	-10.36	-9.06	-10.98	-9.03	-15.54	-21.21
60	-15.31	-11.79	-15.75	-13.02	-11.33	-13.72	-14.00	-13.81	-21.70
70	-21.01	-18.81	-18.12	-18.77	-18.63	-21.56	-22.01	-21.15	-22.41
VH ANGLE									
10	-18.90	-15.87	-17.93	-18.41	-11.29	-19.35	-17.73	-17.57	-17.94
20	-20.97	-14.70	-15.89	-17.74	-18.81	-19.83	-15.77	-20.93	-19.15
30	-20.41	-19.16	-16.27	-21.32	-20.26	-23.35	-17.97	-23.86	-19.83
40	-22.93	-20.71	-18.34	-20.70	-18.61	-20.05	-24.11	-19.25	-18.78
50	-22.98	-22.86	-21.46	-21.08	-19.16	-21.72	-24.66	-21.14	-20.54
60	-26.82	-27.41	-23.84	-25.70	-24.14	-27.69	-26.76	-25.91	-23.63
70	-33.36	-31.46	-26.77	-33.70	-28.63	-30.02	-28.07	-31.19	-27.08

DATE- MAY 18, 1977 SITE- 2 LOOK- 4

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-8.92	-5.64	-5.36	-3.68	-6.00	-1.23	-3.06	-9.00	99.00
20	-5.35	-3.13	-8.65	-3.95	-2.55	-3.19	-12.12	-4.71	99.00
30	-10.67	-5.11	-6.01	-4.87	-5.57	-5.16	-6.82	-6.25	99.00
40	-11.67	-7.81	-9.54	-9.28	-9.45	-6.36	-8.49	-11.08	99.00
50	-14.35	-13.24	-12.93	-9.16	-7.92	-8.91	-8.50	-13.07	99.00
60	-18.91	-16.83	-16.78	-15.70	-13.04	-12.39	-10.10	-13.10	99.00
70	-24.25	-21.90	-22.21	-20.94	-17.79	-17.98	-15.30	-19.16	99.00

HV ANGLE

10	-20.95	-16.42	-16.35	-16.67	-17.09	-15.39	-19.97	-11.25	99.00
20	-19.73	-15.19	-18.45	-17.00	-14.90	-15.65	-12.94	-18.30	99.00
30	-20.52	-17.25	-19.63	-19.25	-19.06	-17.45	-15.28	-18.70	99.00
40	-20.30	-18.46	-19.48	-19.64	-19.76	-18.17	-18.65	-16.80	99.00
50	-23.82	-22.72	-19.99	-25.21	-18.40	-24.16	-20.72	-19.39	99.00
60	-26.78	-24.60	-23.47	-26.51	-23.54	-25.56	-22.51	-24.86	99.00
70	-31.40	-28.75	-28.69	-28.84	-27.07	-30.54	-23.71	-29.37	99.00

VV ANGLE

10	-6.13	-6.42	-5.38	-0.48	-3.79	-5.97	-10.17	-11.87	99.00
20	-5.65	-3.09	-7.29	-5.55	-4.88	-5.15	-10.20	-6.56	99.00
30	-9.78	-5.00	-4.14	-4.65	-7.46	-8.18	-10.90	-5.81	99.00
40	-12.79	-7.13	-9.44	-10.56	-8.63	-8.07	-12.47	-14.52	99.00
50	-13.20	-12.81	-12.35	-9.12	-7.98	-9.71	-10.06	-12.24	99.00
60	-17.11	-14.98	-16.21	-15.68	-10.92	-14.49	-16.53	-15.44	99.00
70	-22.90	-20.11	-19.93	-19.87	-21.00	-21.00	-18.59	-20.03	99.00

VH ANGLE

10	-16.74	-15.95	-19.46	-19.45	-20.19	-13.25	-17.56	-16.29	99.00
20	-19.86	-16.32	-16.13	-18.57	-16.56	-15.81	-17.24	-16.78	99.00
30	-21.28	-17.05	-15.70	-18.03	-19.12	-22.81	-15.31	-21.11	99.00
40	-22.47	-19.85	-18.69	-21.02	-17.30	-17.45	-19.42	-19.55	99.00
50	-24.17	-22.62	-19.39	-23.83	-19.58	-24.02	-20.80	-20.95	99.00
60	-26.29	-25.58	-24.15	-26.91	-24.51	-27.18	-23.62	-26.31	99.00
70	-31.19	-28.23	-27.72	-28.66	-27.04	-29.77	-25.33	-31.96	99.00

DATE- MAY 18, 1977 SITE- 2 LOOK- 5

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-11.46	-4.77	-2.89	-2.12	-5.42	-3.77	-3.71	-4.46	99.00
20	-7.47	-8.19	-5.51	-6.01	-4.60	-4.63	0.94	-9.87	99.00
30	-8.09	-8.69	-8.70	-9.41	-3.61	-4.73	-7.27	-7.48	99.00
40	-11.88	-11.62	-9.70	-9.64	-10.53	-9.92	-5.60	-9.25	99.00
50	-15.14	-14.87	-11.10	-9.59	-9.66	-8.58	-10.05	-11.07	99.00
60	-17.58	-15.05	-15.20	-14.57	-14.59	-11.09	-13.26	-13.93	99.00
70	-21.66	-19.96	-20.41	-18.94	-20.08	-17.39	-14.07	-19.89	99.00
HV ANGLE									
10	-17.69	-17.70	-17.99	-15.54	-15.59	-20.72	-16.66	-16.00	99.00
20	-22.33	-19.25	-19.12	-21.83	-19.80	-20.88	-18.49	-19.37	99.00
30	-24.50	-18.87	-16.78	-21.70	-16.48	-20.38	-19.41	-19.63	99.00
40	-22.50	-20.80	-18.64	-22.49	-20.58	-21.65	-19.70	-20.90	99.00
50	-25.01	-23.82	-22.52	-22.76	-22.10	-22.19	-18.43	-23.89	99.00
60	-28.47	-26.42	-26.84	-26.97	-26.40	-24.62	-21.46	-23.15	99.00
70	-34.30	-31.51	-29.10	-32.82	-29.68	-28.71	-25.42	-27.20	99.00
VV ANGLE									
10	-11.31	-4.06	-4.13	-0.71	-9.14	-5.59	-7.86	-3.83	99.00
20	-5.93	-4.49	-4.08	-4.29	-5.30	-2.75	-6.88	-12.22	99.00
30	-7.30	-8.13	-8.51	-8.55	-3.41	-7.31	-7.43	-5.33	99.00
40	-12.32	-11.70	-9.98	-12.85	-12.38	-12.56	-11.21	-6.35	99.00
50	-15.07	-12.38	-9.90	-10.89	-11.27	-12.38	-13.58	-13.64	99.00
60	-17.16	-14.52	-16.60	-13.37	-14.69	-13.11	-15.34	-15.75	99.00
70	-23.15	-20.88	-19.61	-18.74	-19.24	-19.52	-18.67	-18.11	99.00
VH ANGLE									
10	-22.04	-20.34	-19.53	-16.57	-16.20	-15.96	-17.87	-18.69	99.00
20	-24.18	-18.85	-19.18	-23.21	-14.88	-23.70	-19.02	-21.67	99.00
30	-25.58	-19.80	-19.31	-19.38	-18.17	-22.10	-21.02	-20.08	99.00
40	-23.03	-21.80	-20.69	-20.54	-19.98	-22.34	-20.92	-20.52	99.00
50	-24.86	-23.49	-22.09	-22.27	-21.50	-22.50	-21.15	-24.98	99.00
60	-28.84	-26.70	-25.54	-27.05	-26.28	-24.76	-22.21	-24.78	99.00
70	-34.06	-31.68	-29.54	-33.40	-31.69	-29.19	-29.05	-29.10	99.00

DATE- MAY 18, 1977 SITE- 2 LOOK- 6

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-5.91	-2.81	-5.42	-0.09	-0.07	-4.86	-1.78	-4.11	99.00
20	-6.15	-8.71	-5.35	-13.42	-6.29	-4.00	-6.84	-6.66	99.00
30	-8.85	-7.94	-8.36	-5.84	-7.19	-5.86	-6.10	-8.78	99.00
40	-10.68	-10.09	-7.61	-9.44	-9.93	-8.24	-4.72	-8.22	99.00
50	-13.72	-15.79	-10.04	-10.68	-10.26	-11.54	-6.65	-7.15	99.00
60	-16.35	-10.92	-13.34	-12.70	-12.05	-11.11	-8.99	-13.72	99.00
70	-20.03	-17.20	-17.07	-14.78	-11.59	-14.78	-11.44	-14.40	99.00
HV ANGLE									
10	-19.91	-14.81	-15.48	-19.90	-17.40	-16.80	-15.56	-16.13	99.00
20	-19.09	-21.41	-18.58	-17.82	-17.58	-21.50	-16.77	-15.38	99.00
30	-23.81	-19.83	-18.34	-19.36	-16.94	-16.16	-15.50	-18.26	99.00
40	-22.04	-18.70	-19.77	-17.92	-16.45	-20.91	-17.24	-21.17	99.00
50	-25.04	-19.27	-20.49	-20.21	-21.40	-21.67	-15.81	-16.59	99.00
60	-27.12	-26.76	-24.14	-24.43	-26.60	-23.93	-18.57	-21.90	99.00
70	-30.70	-28.24	-27.46	-28.21	-27.81	-26.45	-23.26	-25.63	99.00
VV ANGLE									
10	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
20	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
30	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
40	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
50	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
60	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
70	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
VH ANGLE									
10	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
20	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
30	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
40	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
50	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
60	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
70	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

DATE- MAY 19, 1977 SITE- 3 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-11.23	-18.77	-18.24	-13.87	-12.63	-14.50	-24.03	-16.18	-16.60
20	-11.96	-15.01	-14.97	-13.34	-14.92	-15.04	-16.99	-14.82	-13.07
30	-22.38	-16.05	-20.02	-19.81	-15.96	-14.09	-21.32	-18.49	-16.00
40	-22.19	-18.62	-25.31	-21.21	-22.04	-19.87	-20.67	-20.60	-14.27
50	-26.71	-22.41	-19.69	-19.48	-20.57	-17.14	-23.40	-20.91	-14.72
60	-24.20	-22.30	-17.48	-23.23	-16.06	-20.18	-26.07	-21.14	-18.81
70	-21.84	-19.10	-22.49	-19.90	-19.91	-21.41	-22.84	-21.95	-20.84
HV ANGLE									
10	-27.59	-25.36	-26.77	-18.38	-24.64	-21.06	-22.66	-14.91	-14.86
20	-28.31	-28.42	-26.94	-29.09	-27.39	-29.86	-23.47	-11.53	-17.91
30	-27.18	-29.95	-28.74	-28.34	-28.27	-33.41	-22.02	-18.87	-21.54
40	-33.13	-34.54	-28.19	-27.89	-32.23	-33.65	-27.59	-22.62	-22.97
50	-32.63	-29.52	-32.49	-35.19	-35.09	-28.54	-26.53	-25.45	-24.30
60	-32.68	-30.16	-30.55	-34.47	-29.77	-28.00	-28.89	-21.64	-26.50
70	-32.10	-30.29	-29.83	-32.12	-28.58	-30.49	-27.29	-29.49	-27.74
VV ANGLE									
10	-8.00	-17.22	-15.65	-13.47	-16.07	-14.42	-15.01	-13.48	-21.88
20	-9.94	-12.44	-13.23	-11.65	-11.25	-13.66	-13.18	-13.85	-12.61
30	-17.54	-16.03	-15.02	-22.46	-12.35	-14.42	-22.36	-8.08	-15.16
40	-18.85	-21.36	-18.96	-25.34	-19.68	-12.93	-13.79	-18.46	-15.91
50	-24.02	-20.01	-22.92	-19.24	-17.81	-13.47	-16.88	-20.82	-21.27
60	-22.48	-22.71	-18.89	-19.68	-14.69	-17.04	-16.26	-16.24	-19.71
70	-19.35	-20.00	-21.79	-20.03	-19.06	-21.46	-21.13	-13.41	-24.17
VH ANGLE									
10	-28.24	-26.13	-23.47	-24.07	-19.26	-23.43	-22.60	-17.77	-19.27
20	-25.15	-23.96	-26.29	-27.59	-27.21	-27.57	-26.11	-20.18	-18.99
30	-27.33	-32.40	-28.17	-26.42	-27.73	-28.79	-19.95	-18.88	-17.73
40	-30.65	-30.23	-28.27	-26.47	-26.39	-29.19	-26.77	-20.81	-19.97
50	-32.29	-28.44	-30.57	-32.02	-30.96	-25.33	-25.61	-21.97	-20.41
60	-32.12	-28.49	-28.69	-32.19	-28.61	-26.98	-27.65	-23.21	-21.38
70	-30.00	-30.12	-28.14	-31.63	-27.64	-26.99	-28.93	-25.30	-22.93

DATE- MAY 19, 1977 SITE- 3 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-6.47	-6.49	-5.95	-5.17	-3.13	-6.92	-6.96	-5.16	0.60
20	-13.72	-10.81	-16.08	-13.47	-16.03	-14.07	-13.27	-14.13	-11.05
30	-17.35	-17.21	-16.81	-15.15	-10.71	-12.28	-17.70	-16.98	-13.00
40	-20.53	-18.27	-14.99	-17.48	-15.64	-14.90	-16.94	-15.83	-8.84
50	-21.44	-20.86	-18.13	-14.88	-17.24	-15.27	-14.73	-12.82	-12.96
60	-24.38	-22.35	-19.58	-19.19	-18.17	-18.57	-18.25	-16.93	-15.03
70	-30.05	-26.69	-24.30	-23.30	-22.44	-25.75	-23.86	-20.72	-20.08

HV ANGLE									
10	-23.06	-25.55	-21.20	-21.27	-23.41	-28.05	-22.32	-17.82	-12.26
20	-29.82	-30.60	-27.45	-25.75	-20.81	-21.29	-21.68	-17.00	-15.40
30	-30.91	-28.29	-25.33	-26.89	-28.09	-23.98	-20.18	-17.94	-22.19
40	-29.51	-30.20	-26.69	-25.40	-29.60	-25.62	-21.61	-24.16	-19.86
50	-31.07	-30.12	-29.09	-27.58	-26.99	-25.86	-25.93	-22.34	-19.09
60	-34.73	-33.02	-29.81	-28.54	-27.45	-27.75	-26.21	-24.35	-22.11
70	-36.34	-35.46	-32.03	-31.88	-33.53	-30.38	-31.78	-27.46	-27.28

VV ANGLE									
10	-4.10	-4.07	-3.50	-0.48	2.18	1.75	-1.01	-1.10	3.80
20	-15.78	-12.49	-17.06	-18.46	-12.91	-6.90	-6.93	-9.57	-7.32
30	-16.38	-16.63	-16.79	-12.64	-9.29	-12.42	-15.73	-9.77	-9.60
40	-19.49	-15.94	-15.02	-16.46	-16.42	-14.33	-11.78	-10.54	-10.75
50	-19.95	-20.39	-18.78	-15.37	-17.68	-13.70	-14.96	-10.26	-9.33
60	-22.80	-21.51	-20.55	-18.46	-17.37	-16.06	-14.63	-11.78	-9.11
70	-26.55	-24.72	-21.55	-20.57	-17.95	-16.97	-16.65	-14.52	-15.72

VH ANGLE									
10	-24.64	-23.78	-19.58	-21.63	-19.23	-20.32	-24.51	-23.82	-16.52
20	-27.83	-26.11	-28.68	-24.68	-19.86	-20.41	-22.01	-16.93	-16.78
30	-29.98	-29.44	-27.39	-25.42	-31.42	-25.91	-23.65	-18.66	-19.62
40	-26.19	-26.81	-27.49	-24.10	-23.64	-32.84	-32.30	-30.27	-23.16
50	-30.80	-29.90	-30.06	-26.12	-26.43	-27.25	-26.88	-24.43	-19.30
60	-38.48	-36.46	-36.79	-28.43	-30.66	-32.26	-31.23	-27.85	-25.05
70	-38.57	-35.94	-35.47	-28.64	-29.07	-38.37	-39.72	-34.62	-28.42

DATE- MAY 20, 1977 SITE- 3 LOOK- 3

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-11.59	-11.28	-9.83	-7.69	-15.88	-11.48	-13.77	-11.48	-15.28
20	-15.54	-13.61	-13.62	-10.14	-8.97	-7.51	-16.91	-13.41	-7.16
30	-19.60	-14.21	-13.89	-12.02	-20.22	-19.91	-19.16	-16.87	-15.38
40	-20.42	-21.10	-15.75	-15.60	-13.78	-15.93	-15.45	-14.45	-20.01
50	-18.95	-21.69	-18.05	-18.78	-17.12	-16.87	-14.22	-16.16	-16.87
60	-24.01	-22.05	-17.38	-18.54	-17.70	-19.87	-20.87	-17.09	-18.87
70	-28.67	-24.05	-23.01	-24.50	-23.57	-22.52	-23.32	-22.99	-20.20

HV ANGLE

10	-29.32	-31.30	-25.34	-21.04	-19.13	-25.78	-21.06	-19.39	-20.43
20	-28.66	-26.69	-27.03	-21.68	-23.08	-22.13	-20.88	-20.71	-22.47
30	-26.85	-30.32	-29.88	-24.49	-27.98	-26.65	-25.89	-27.16	-22.96
40	-31.79	-30.54	-26.19	-25.81	-27.12	-27.20	-20.96	-24.20	-25.60
50	-34.54	-30.60	-29.31	-27.08	-27.12	-29.29	-29.08	-26.59	-24.31
60	-36.53	-37.32	-35.46	-27.48	-30.40	-27.98	-27.98	-30.23	-26.95
70	-41.61	-38.32	-37.45	-31.17	-34.88	-32.87	-35.06	-34.33	-29.43

VV ANGLE

10	-9.28	-7.10	-3.34	-8.54	-12.27	-5.42	-4.20	-9.01	-6.87
20	-12.43	-8.70	-11.88	-8.02	-7.05	-7.86	-9.90	-5.26	-4.04
30	-18.54	-14.23	-12.93	-11.18	-18.44	-14.87	-12.12	-10.75	-13.76
40	-17.60	-18.23	-15.40	-10.38	-13.20	-10.89	-12.40	-12.14	-13.14
50	-19.55	-17.19	-17.37	-14.29	-15.26	-11.51	-12.79	-13.29	-16.53
60	-21.57	-22.80	-17.98	-17.43	-18.11	-16.44	-15.59	-15.43	-15.14
70	-26.65	-23.50	-24.05	-22.27	-20.36	-18.32	-19.15	-18.71	-19.94

VH ANGLE

10	-26.99	-32.07	-22.85	-22.76	-22.17	-23.43	-23.08	-21.45	-18.23
20	-30.74	-30.30	-23.01	-21.25	-24.78	-23.15	-22.82	-22.28	-24.29
30	-29.50	-32.60	-28.56	-23.66	-26.29	-27.98	-25.15	-28.07	-22.64
40	-32.50	-28.40	-25.94	-25.14	-28.94	-27.33	-25.61	-23.06	-23.56
50	-32.68	-30.83	-29.46	-26.52	-24.67	-28.59	-29.18	-27.02	-24.67
60	-38.06	-37.78	-33.40	-25.90	-30.59	-27.64	-28.50	-29.57	-27.72
70	-42.01	-39.30	-37.72	-28.70	-35.08	-33.48	-36.12	-33.89	-30.43

DATE- MAY 20, 1977 SITE- 3 LOOK- 4

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-16.81	-8.14	-5.77	-7.93	-1.72	0.27	-9.34	-4.70	-7.56
20	-11.51	-13.52	-8.60	-10.36	-7.32	-10.31	-14.54	-10.49	-9.33
30	-21.62	-16.10	-12.01	-14.11	-11.07	-10.63	-14.04	-8.96	-10.67
40	-22.78	-16.97	-17.40	-15.77	-14.03	-15.61	-16.23	-11.72	-16.99
50	-20.20	-18.82	-22.67	-18.19	-16.55	-18.74	-13.66	-18.85	-15.00
60	-23.85	-23.83	-20.47	-20.84	-15.54	-16.73	-20.54	-18.85	-18.94
70	-29.55	-26.38	-22.46	-22.56	-20.60	-23.40	-22.08	-22.18	-24.30

HV ANGLE

10	-25.69	-28.17	-22.69	-24.67	-25.56	-18.38	-15.64	-16.23	-20.48
20	-32.71	-26.28	-22.93	-23.58	-23.01	-26.42	-21.47	-23.55	-19.46
30	-29.86	-29.12	-24.45	-24.11	-23.87	-26.76	-23.51	-22.75	-18.42
40	-32.99	-29.21	-25.18	-25.86	-24.01	-23.26	-25.23	-24.74	-20.49
50	-34.95	-29.38	-25.95	-30.50	-26.82	-28.83	-27.55	-25.97	-20.69
60	-34.39	-34.84	-33.59	-29.47	-27.85	-27.46	-31.12	-23.29	-22.37
70	-39.96	-38.07	-34.99	-31.48	-32.62	-33.70	-31.01	-27.24	-26.25

VV ANGLE

10	-10.99	-6.85	-3.14	-9.12	-1.55	1.96	-3.58	1.47	1.18
20	-13.41	-10.50	-7.22	-9.40	-5.04	-6.14	-6.93	-5.91	-6.18
30	-19.82	-16.08	-11.47	-11.84	-9.03	-7.81	-7.76	-6.29	-6.85
40	-20.94	-13.10	-16.27	-11.83	-14.53	-8.53	-11.30	-5.38	-10.65
50	-18.02	-18.52	-18.63	-12.96	-12.41	-15.91	-14.54	-13.91	-11.76
60	-23.30	-19.58	-17.81	-15.51	-14.02	-14.32	-14.90	-13.91	-11.17
70	-25.13	-26.16	-20.58	-19.81	-19.43	-20.26	-18.46	-17.38	-19.36

VH ANGLE

10	-28.13	-32.31	-19.49	-23.85	-21.59	-22.33	-22.56	-18.51	-20.29
20	-29.81	-25.44	-22.73	-26.22	-20.96	-26.93	-24.34	-24.39	-18.88
30	-29.90	-32.49	-23.68	-22.22	-27.71	-25.14	-32.18	-27.35	-21.22
40	-31.99	-27.40	-25.58	-25.23	-25.08	-22.55	-25.70	-26.88	-22.66
50	-33.70	-29.29	-26.40	-28.87	-26.06	-27.61	-28.23	-28.99	-26.14
60	-35.26	-34.25	-33.83	-29.55	-28.23	-28.67	-31.86	-24.74	-25.56
70	-37.98	-38.68	-35.23	-31.30	-32.54	-33.27	-31.47	-31.92	-30.03

DATE- MAY 20, 1977 SITE- 3 LOOK- 5

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-5.53	-6.46	-3.97	-4.49	-1.77	-12.34	-12.36	-5.90	-10.42
20	-18.26	-14.10	-10.78	-9.24	-6.56	-8.93	-10.48	-9.86	-10.31
30	-17.44	-14.34	-10.73	-10.10	-12.56	-14.90	-14.10	-17.26	-15.23
40	-17.07	-17.84	-15.97	-18.09	-14.49	-12.87	-16.00	-21.17	-14.60
50	-23.39	-23.04	-24.02	-19.17	-13.87	-16.95	-21.39	-17.27	-16.90
60	-25.07	-25.36	-20.07	-20.34	-15.59	-14.93	-21.49	-20.62	-21.48
70	-31.59	-27.46	-27.82	-25.27	-21.20	-22.01	-26.83	-21.10	-21.71
HV ANGLE									
10	-32.89	-26.83	-21.51	-22.15	-19.77	-26.24	-21.96	-21.40	-19.12
20	-29.95	-25.45	-24.27	-24.34	-26.42	-24.64	-24.11	-26.81	-18.28
30	-29.28	-31.62	-31.67	-25.87	-26.35	-23.48	-22.85	-22.65	-20.27
40	-33.96	-30.55	-27.97	-26.30	-26.41	-23.99	-21.59	-25.98	-22.45
50	-39.04	-37.57	-31.28	-29.55	-26.26	-28.18	-23.26	-26.65	-22.34
60	-39.70	-36.55	-29.98	-30.70	-27.80	-28.89	-33.10	-28.75	-23.77
70	-41.93	-41.48	-37.35	-33.28	-34.46	-35.22	-33.71	-32.31	-27.54
VV ANGLE									
10	-4.49	-2.80	-6.81	-0.24	0.37	-9.82	-5.96	-2.79	-9.45
20	-15.40	-12.39	-7.69	-7.99	-4.43	-6.18	-8.07	-7.56	-6.68
30	-15.87	-12.98	-11.53	-8.72	-11.74	-12.86	-9.87	-12.24	-10.21
40	-16.16	-16.99	-14.46	-14.17	-13.17	-10.83	-13.16	-13.81	-8.83
50	-22.37	-20.06	-23.16	-18.34	-15.04	-13.20	-18.62	-12.42	-16.31
60	-23.67	-23.93	-19.45	-15.34	-16.35	-14.63	-20.94	-18.04	-17.62
70	-30.05	-27.59	-26.31	-22.41	-19.92	-21.57	-22.14	-17.72	-20.95
VH ANGLE									
10	-28.36	-30.26	-23.76	-22.74	-21.35	-27.60	-20.50	-19.20	-20.06
20	-27.99	-25.64	-23.70	-25.18	-29.45	-26.07	-26.41	-23.58	-19.44
30	-28.49	-30.56	-33.12	-26.45	-26.76	-24.57	-25.14	-22.70	-22.69
40	-30.86	-30.08	-28.40	-25.36	-28.49	-24.09	-20.41	-25.66	-24.96
50	-37.90	-37.51	-30.60	-28.72	-26.08	-28.40	-23.46	-26.28	-27.56
60	-37.71	-36.14	-29.94	-29.37	-29.65	-30.35	-31.66	-28.03	-27.54
70	-42.58	-39.81	-37.81	-33.05	-35.73	-34.55	-34.12	-33.90	-33.06

DATE- MAY 21, 1977 SITE- 3 LOOK- 6

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-6.07	-5.16	-5.11	0.96	-4.88	-6.52	-12.18	-6.51	-5.60
20	-16.83	-12.48	-9.03	-17.71	-4.92	-6.73	-7.97	-11.77	-12.60
30	-13.87	-13.77	-11.95	-9.88	-18.80	-17.67	-16.42	-14.74	-13.47
40	-17.89	-22.61	-17.71	-14.36	-14.05	-18.17	-18.10	-19.12	-17.86
50	-21.73	-21.45	-19.92	-20.61	-15.14	-14.75	-18.81	-9.11	-20.15
60	-26.14	-24.23	-19.42	-18.41	-16.78	-20.42	-23.85	-22.24	-20.21
70	-27.70	-27.39	-25.15	-28.42	-20.59	-22.38	-26.50	-25.45	-24.94
HV ANGLE									
10	-28.13	-31.88	-25.73	-18.89	-23.74	-18.22	-25.10	-24.80	-22.81
20	-30.22	-30.51	-23.65	-27.95	-24.98	-28.11	-27.12	-28.17	-22.93
30	-35.32	-29.90	-26.57	-25.89	-25.62	-24.96	-27.40	-25.68	-24.90
40	-34.13	-33.25	-26.45	-30.97	-29.68	-27.26	-27.09	-26.51	-22.82
50	-36.62	-35.31	-32.84	-29.60	-26.67	-28.49	-30.08	-33.25	-25.21
60	-39.50	-35.41	-30.36	-31.50	-30.16	-30.66	-32.09	-30.60	-23.67
70	-44.21	-42.14	-37.16	-34.69	-37.03	-36.85	-34.56	-32.36	-29.01
VV ANGLE									
10	-5.87	-5.11	-2.22	1.90	-0.38	-7.97	-4.27	-4.28	0.62
20	-14.44	-10.56	-6.52	-15.72	-7.93	-3.97	-3.45	-3.98	-7.76
30	-13.23	-10.88	-9.79	-7.20	-12.96	-11.06	-12.91	-11.08	-9.11
40	-14.53	-18.63	-14.93	-10.65	-10.85	-11.27	-12.49	-11.78	-14.92
50	-18.23	-19.53	-17.87	-16.68	-16.52	-14.38	-16.64	-11.20	-16.78
60	-20.63	-20.61	-18.21	-15.38	-16.66	-18.54	-17.47	-14.91	-16.68
70	-25.31	-24.28	-20.71	-23.29	-20.28	-17.87	-20.03	-21.39	-18.93
VH ANGLE									
10	-27.81	-28.54	-16.53	-20.91	-17.66	-20.62	-27.53	-21.41	-19.67
20	-30.30	-29.75	-24.68	-28.28	-27.93	-23.35	-27.96	-21.09	-20.67
30	-33.35	-30.05	-26.44	-24.56	-24.98	-26.02	-31.37	-22.99	-23.65
40	-32.82	-31.80	-26.04	-28.90	-27.38	-28.88	-27.92	-23.30	-25.14
50	-33.21	-34.00	-31.60	-28.83	-26.57	-28.74	-29.84	-25.07	-26.55
60	-38.10	-35.14	-31.08	-30.47	-28.83	-29.68	-32.60	-26.62	-27.16
70	-41.41	-40.73	-37.21	-33.39	-35.23	-35.51	-34.56	-29.42	-31.35

DATE- MAY 21, 1977 SITE- 4 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-8.25	-4.69	-0.94	1.76	2.49	-7.34	-5.61	-6.27	-4.24
20	-9.11	-6.50	-5.19	-7.60	-2.23	-7.16	-9.99	-7.56	-8.62
30	-15.34	-13.63	-11.34	-9.85	-5.35	-12.40	-10.68	-8.46	-13.67
40	-12.93	-13.90	-9.58	-13.78	-9.14	-12.65	-13.28	-16.02	-14.49
50	-14.79	-14.37	-11.60	-17.33	-17.42	-16.22	-16.76	-17.38	-14.32
60	-20.97	-20.33	-19.65	-14.85	-16.81	-19.01	-22.97	-21.08	-20.46
70	-27.07	-23.80	-23.89	-26.60	-26.93	-27.03	-30.39	-28.04	-24.48

HV ANGLE

10	-17.71	-17.43	-15.83	-13.55	-10.64	-12.04	-12.26	-14.39	-13.66
20	-19.61	-18.76	-17.02	-18.62	-16.87	-20.32	-19.68	-14.76	-14.85
30	-22.69	-23.19	-18.92	-20.39	-16.73	-22.28	-23.67	-19.97	-19.26
40	-25.32	-21.59	-22.37	-22.03	-20.22	-17.86	-19.87	-22.16	-19.48
50	-27.49	-28.19	-22.16	-24.90	-21.55	-20.48	-24.38	-21.42	-19.18
60	-28.21	-28.85	-28.08	-26.75	-25.61	-26.14	-23.84	-25.87	-22.07
70	-37.54	-34.62	-32.91	-35.14	-35.42	-38.47	-33.54	-31.96	-25.86

VV ANGLE

10	-5.15	-3.80	-1.43	0.96	6.85	5.38	-3.05	-0.30	-0.05
20	-8.48	-6.11	-3.15	-5.33	-2.84	-6.01	-5.97	-2.22	-5.78
30	-14.90	-13.05	-8.86	-6.13	-3.13	-7.20	-4.97	-7.04	-7.62
40	-13.80	-13.89	-9.44	-11.60	-8.40	-13.13	-12.24	-9.63	-9.69
50	-14.18	-13.93	-12.31	-11.31	-13.04	-13.22	-14.63	-11.57	-11.73
60	-21.46	-20.75	-18.40	-14.90	-14.79	-16.60	-18.97	-19.30	-18.81
70	-25.65	-22.97	-22.54	-22.59	-25.63	-25.47	-22.41	-26.66	-22.95

VH ANGLE

10	-19.64	-17.96	-15.33	-14.05	-8.98	-11.72	-12.75	-11.75	-10.05
20	-19.29	-16.61	-16.10	-20.04	-16.91	-18.17	-16.78	-16.59	-16.27
30	-23.14	-21.06	-19.05	-20.27	-15.44	-21.90	-23.06	-20.14	-18.50
40	-26.33	-21.08	-21.90	-24.63	-22.25	-21.64	-20.49	-20.97	-18.68
50	-26.30	-26.20	-23.86	-23.47	-21.78	-22.39	-26.44	-20.70	-21.52
60	-27.21	-28.10	-27.12	-26.42	-25.27	-26.27	-23.64	-23.13	-22.97
70	-35.41	-34.93	-33.75	-33.07	-35.95	-38.43	-34.13	-28.21	-30.09

DATE- MAY 22, 1977 SITE- 4 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-1.26	-3.32	3.09	1.02	-0.04	-2.49	-1.72	-2.85	-4.45
20	-10.91	-9.59	-6.53	-5.79	-4.49	-8.09	-7.81	-10.67	-6.75
30	-10.78	-8.78	-8.91	-9.21	-8.31	-9.94	-13.79	-14.46	-13.34
40	-16.02	-14.74	-9.84	-9.20	-12.13	-10.36	-11.95	-13.50	-13.81
50	-17.67	-14.42	-13.41	-9.41	-9.94	-10.65	-14.31	-16.03	-13.38
60	-14.85	-19.56	-15.02	-15.15	-13.16	-13.92	-12.64	-17.48	-13.56
70	-23.40	-21.62	-19.28	-19.34	-19.33	-21.62	-20.50	-21.77	-20.45
HV ANGLE									
10	-23.80	-16.76	-12.86	-15.07	-15.91	-12.58	-8.05	-11.72	-8.57
20	-19.86	-15.87	-15.35	-20.05	-13.08	-13.41	-13.85	-17.38	-11.84
30	-22.35	-21.02	-18.81	-18.48	-18.69	-14.99	-24.49	-22.52	-18.28
40	-21.18	-22.07	-19.96	-19.77	-17.44	-18.37	-17.13	-18.70	-17.77
50	-25.53	-22.50	-22.84	-20.85	-20.60	-19.35	-19.27	-18.07	-16.39
60	-28.00	-25.69	-22.23	-24.71	-20.67	-21.06	-19.95	-21.00	-22.16
70	-33.94	-35.52	-31.10	-32.89	-32.53	-29.83	-33.60	-32.07	-27.71
VV ANGLE									
10	-0.43	-1.95	4.50	3.09	-2.27	1.02	0.01	3.14	2.15
20	-7.00	-8.67	-6.37	-3.79	-3.23	-4.26	-3.00	-5.27	-1.66
30	-7.01	-7.43	-8.93	-6.02	-6.58	-6.61	-10.47	-8.29	-6.56
40	-10.64	-12.41	-10.00	-7.39	-8.25	-4.89	-6.19	-9.81	-9.42
50	-15.22	-13.81	-12.33	-9.02	-8.05	-10.41	-10.71	-14.72	-13.60
60	-17.15	-18.77	-16.80	-14.58	-10.17	-12.33	-13.13	-13.64	-10.92
70	-24.80	-24.11	-23.78	-20.01	-20.28	-23.11	-24.43	-21.97	-22.01
VH ANGLE									
10	-19.08	-17.72	-11.93	-14.89	-10.32	-12.44	-10.91	-9.84	-13.31
20	-20.50	-16.40	-15.07	-17.95	-13.56	-14.44	-13.43	-13.99	-11.94
30	-21.12	-20.51	-19.44	-18.57	-17.46	-17.81	-20.28	-19.13	-16.04
40	-19.99	-19.36	-18.51	-19.76	-15.87	-17.14	-17.81	-16.72	-17.84
50	-25.51	-21.94	-20.11	-19.69	-19.90	-19.21	-19.48	-17.05	-19.32
60	-24.41	-27.33	-22.21	-25.00	-21.57	-22.78	-21.87	-19.71	-22.02
70	-33.12	-32.44	-29.57	-30.77	-31.04	-30.13	-31.28	-31.01	-29.69

DATE- MAY 22, 1977 SITE- 5 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-0.09	-2.39	-2.70	-3.61	-3.99	-5.19	-6.63	2.07	3.79
20	-4.25	-2.56	-2.64	0.55	2.43	-0.17	-7.66	-2.49	0.24
30	-5.87	-4.83	-4.96	-4.74	-2.27	-3.72	-2.24	-1.94	-2.54
40	-7.71	-9.57	-5.25	-3.41	-4.23	-7.03	-10.58	-3.94	-0.12
50	-13.11	-9.59	-9.71	-7.19	-4.37	-6.58	-5.71	-5.04	-8.22
60	-13.87	-12.94	-9.22	-13.13	-5.77	-14.77	-10.77	-12.76	-11.11
70	-18.07	-18.41	-16.52	-17.03	-15.66	-17.97	-20.41	-17.64	-16.34

HV ANGLE									
10	-16.47	-11.21	-13.32	-12.15	-11.53	-12.98	-5.46	-6.22	-8.02
20	-15.43	-14.95	-13.12	-13.35	-12.94	-7.35	-11.32	-10.44	-4.91
30	-15.21	-14.78	-15.99	-12.48	-13.16	-11.16	-9.41	-12.39	-6.97
40	-17.94	-16.13	-14.16	-12.80	-17.04	-12.39	-10.39	-9.69	-12.39
50	-18.91	-18.32	-17.14	-17.90	-16.58	-16.63	-13.84	-13.06	-14.44
60	-20.05	-20.68	-24.48	-19.13	-21.62	-18.66	-17.09	-17.76	-15.58
70	-28.48	-26.13	-26.94	-23.36	-27.66	-23.39	-24.12	-25.76	-23.06

VV ANGLE									
10	-0.20	-3.72	0.67	0.55	-1.42	3.34	-0.57	0.66	5.38
20	-5.97	-1.71	-0.96	0.26	4.68	4.46	-1.01	2.14	4.56
30	-6.03	-2.06	-5.05	-1.76	0.93	0.13	2.58	2.68	1.93
40	-6.97	-10.06	-5.10	-2.43	-3.02	-4.66	-8.39	-5.65	1.90
50	-9.27	-11.17	-8.50	-5.52	-1.51	-6.44	-0.20	-4.01	-2.66
60	-14.94	-11.84	-9.66	-9.71	-3.72	-11.97	-9.36	-10.30	-12.52
70	-15.57	-18.23	-13.61	-13.37	-13.77	-13.88	-17.30	-13.52	-15.84

VH ANGLE									
10	-13.91	-11.80	-15.30	-14.59	-11.42	-12.66	-11.46	-7.90	-6.72
20	-14.05	-15.17	-14.27	-12.84	-14.37	-11.41	-11.08	-9.70	-10.61
30	-16.25	-15.63	-16.62	-15.19	-13.86	-12.77	-8.31	-10.07	-10.36
40	-17.96	-17.38	-14.45	-14.92	-18.30	-12.97	-11.11	-10.01	-13.27
50	-20.86	-20.08	-19.03	-18.91	-17.53	-16.93	-15.63	-12.80	-15.97
60	-20.89	-21.76	-22.38	-21.48	-20.23	-18.73	-18.00	-18.72	-15.09
70	-27.82	-24.83	-28.28	-23.90	-26.21	-22.55	-23.38	-25.29	-26.38

DATE- MAY 23, 1977 SITE- 5 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	0.83	-0.79	-4.39	-0.98	-1.81	-1.10	-3.79	-0.81	-1.28
20	-1.88	-1.52	-2.42	-0.58	-2.40	-4.99	-6.63	0.32	-5.97
30	-5.70	-2.06	-3.05	-3.95	-1.72	-4.74	-2.83	-5.09	-1.56
40	-7.21	-3.51	-5.23	-6.28	-5.14	-2.30	-4.14	-7.47	-4.78
50	-9.79	-7.87	-7.54	-5.29	-3.47	-10.97	-10.45	-5.97	-7.94
60	-11.39	-12.45	-8.29	-9.90	-9.88	-9.53	-10.89	-6.15	-7.07
70	-15.87	-16.55	-14.51	-13.77	-14.47	-14.00	-14.98	-16.20	-13.61

HV ANGLE									
10	-11.74	-11.15	-10.44	-9.94	-9.29	-7.54	-5.76	-4.96	-3.72
20	-13.85	-10.66	-9.21	-9.06	-7.84	-7.66	-5.23	-5.72	-4.21
30	-12.28	-12.22	-11.14	-10.66	-9.95	-7.90	-7.28	-4.09	-5.34
40	-14.48	-14.31	-14.53	-12.30	-8.29	-7.80	-5.96	-8.70	-6.14
50	-16.41	-14.81	-13.42	-13.63	-11.92	-11.42	-8.56	-6.25	-6.52
60	-20.34	-14.96	-17.00	-14.84	-13.45	-13.32	-10.34	-8.95	-9.10
70	-23.59	-24.81	-20.33	-18.76	-19.35	-19.85	-16.81	-18.20	-14.43

VV ANGLE									
10	3.97	2.75	-0.07	3.40	2.09	4.34	3.60	4.10	1.77
20	2.86	1.57	0.97	2.35	-0.52	0.35	0.83	3.87	1.37
30	0.18	-1.54	-0.30	-2.62	-0.50	-1.24	2.30	0.95	1.36
40	-4.88	-3.52	-2.86	-1.91	-2.45	0.45	0.70	2.81	0.33
50	-5.61	-1.38	-4.58	-1.85	-1.13	-3.35	-2.47	-1.85	-2.49
60	-8.07	-5.77	-3.52	-2.09	-6.08	-5.68	-5.63	-2.33	-4.64
70	-12.92	-11.75	-11.78	-8.60	-10.16	-11.61	-11.38	-10.97	-10.19

VH ANGLE									
10	-8.87	-9.99	-10.01	-11.67	-11.37	-6.70	-3.90	-6.41	-4.35
20	-11.23	-10.04	-9.90	-9.23	-9.18	-7.53	-6.55	-6.18	-3.12
30	-12.01	-12.75	-8.61	-10.14	-9.46	-8.41	-5.53	-4.35	-6.44
40	-13.00	-12.00	-11.88	-11.31	-8.69	-9.43	-7.94	-8.47	-6.84
50	-14.31	-13.24	-14.26	-13.23	-12.68	-9.27	-8.96	-6.19	-7.41
60	-19.32	-17.27	-16.58	-17.02	-14.95	-13.86	-11.93	-10.31	-11.25
70	-22.16	-23.80	-18.95	-18.34	-19.00	-17.48	-17.46	-17.10	-20.55

DATE- MAY 23, 1977 SITE- 5 LOOK- 3

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-0.80	-3.79	-3.22	-2.11	-1.15	-3.54	-2.08	-5.49	-2.01
20	-3.64	-4.13	-8.16	-5.65	1.05	-9.90	-7.41	-4.08	-4.71
30	-7.61	-5.42	-6.35	-1.55	-5.29	-3.96	-7.04	-2.10	-4.47
40	-10.96	-7.90	-7.39	-3.91	-5.09	-5.35	-5.08	-6.27	-6.18
50	-10.12	-8.91	-5.95	-7.67	-6.53	-8.70	-10.19	-5.39	-7.73
60	-13.63	-12.88	-8.58	-10.29	-7.65	-9.00	-12.68	-7.82	-8.06
70	-15.45	-12.88	-12.02	-14.01	-13.81	-12.89	-11.65	-13.52	-11.54

HV ANGLE

10	-14.96	-13.26	-12.16	-11.60	-11.93	-11.39	-10.24	-7.59	-4.50
20	-15.14	-9.15	-10.84	-12.35	-10.65	-9.37	-8.69	-7.08	-7.09
30	-16.82	-9.66	-11.75	-11.36	-11.21	-11.65	-6.92	-10.61	-7.64
40	-17.10	-14.16	-15.31	-13.50	-12.25	-11.58	-15.54	-10.82	-8.46
50	-19.37	-18.08	-14.45	-15.09	-14.80	-13.20	-14.13	-10.85	-12.59
60	-21.11	-16.41	-17.69	-15.46	-15.34	-14.48	-12.42	-10.59	-15.98
70	-20.37	-14.44	-15.96	-19.03	-19.09	-17.26	-15.05	-15.32	-15.80

VV ANGLE

10	-1.19	-0.73	-3.01	5.24	2.47	0.33	1.04	4.18	3.37
20	0.34	-1.64	-3.16	1.08	3.73	-3.90	-3.21	-1.55	2.65
30	-5.06	-1.82	-2.69	0.76	-0.93	2.02	-2.99	3.14	-1.66
40	-5.74	-3.82	-4.53	-0.97	1.58	-2.94	-1.89	-1.34	1.01
50	-5.22	-6.57	-7.20	-4.40	-0.49	-2.81	-2.80	-1.66	-8.91
60	-9.62	-9.29	-6.54	-9.18	-4.83	-6.32	-8.32	-4.07	-3.80
70	-10.39	-8.55	-10.41	-11.67	-9.42	-9.39	-8.39	-5.87	-8.79

VH ANGLE

10	-13.96	-12.57	-12.81	-14.06	-13.56	-11.03	-7.81	-7.47	-7.37
20	-14.90	-10.48	-10.68	-13.46	-11.72	-8.80	-8.90	-7.61	-7.30
30	-14.37	-12.82	-13.82	-12.29	-14.20	-13.00	-8.79	-10.47	-12.19
40	-15.01	-14.44	-15.32	-13.69	-11.88	-13.57	-16.06	-10.53	-10.64
50	-17.45	-16.43	-12.36	-15.10	-15.96	-14.37	-16.14	-12.55	-15.01
60	-16.06	-15.62	-16.34	-17.34	-17.34	-14.30	-16.23	-12.36	-15.80
70	-19.08	-18.30	-16.65	-18.28	-17.54	-16.69	-15.73	-15.38	-16.54

DATE- MAY 23, 1977 SITE- 5 LOOK- 4

FREQ	9	10	11	12	13	14	15	16	17
------	---	----	----	----	----	----	----	----	----

HH ANGLE

10	-6.40	-5.65	-0.30	2.24	2.06	-2.97	-6.76	-6.44	0.31
20	-3.63	-3.91	-3.34	-0.71	-0.62	-0.06	-4.29	-1.99	3.93
30	-5.77	-6.87	-5.69	-5.03	-2.77	-0.10	1.54	-2.76	-8.10
40	-9.10	-7.44	-6.26	-5.91	-5.21	-3.21	-6.93	-7.33	-8.17
50	-9.93	-9.97	-8.42	-7.52	-7.41	-9.64	-5.40	-9.59	-8.67
60	-12.99	-10.92	-9.24	-9.56	-9.33	-10.18	-11.09	-11.16	-10.32
70	-16.92	-17.17	-16.19	-18.56	-11.99	-14.57	-15.01	-13.72	-12.73

HV ANGLE

10	-17.25	-16.91	-12.28	-8.72	-10.91	-13.82	-12.91	-8.69	-7.89
20	-16.37	-15.69	-14.79	-14.55	-10.64	-12.35	-12.65	-12.70	-10.17
30	-15.23	-15.44	-15.64	-13.37	-11.72	-13.89	-11.26	-10.86	-15.00
40	-18.97	-14.60	-18.33	-18.21	-15.81	-13.87	-15.15	-13.08	-13.01
50	-19.40	-18.36	-16.60	-13.97	-14.65	-15.42	-15.93	-12.89	-15.68
60	-20.29	-18.88	-18.58	-17.46	-18.12	-17.28	-16.68	-18.55	-17.05
70	-23.52	-22.90	-23.14	-23.84	-21.05	-23.24	-21.19	-16.94	-19.75

VV ANGLE

10	-2.30	0.89	-0.88	5.04	5.87	1.92	-2.81	0.73	0.70
20	-4.89	-4.04	-1.48	-1.26	4.42	3.11	-0.74	4.80	-0.85
30	-5.50	-2.15	-6.80	-1.01	1.53	1.44	4.99	0.68	-5.39
40	-4.84	-4.07	-3.65	-6.81	-5.15	-3.34	-1.53	-1.08	-3.98
50	-9.46	-7.31	-6.41	-3.70	-5.13	-7.71	-2.97	-6.38	-7.92
60	-13.34	-8.25	-8.24	-6.35	-6.79	-5.06	-5.25	-7.82	-7.03
70	-14.92	-13.89	-13.80	-13.29	-11.65	-9.29	-10.24	-10.36	-9.05

VH ANGLE

10	-14.76	-15.66	-12.65	-12.02	-13.32	-13.50	-11.73	-10.75	-14.15
20	-16.95	-16.52	-18.04	-15.97	-14.08	-11.32	-10.02	-17.47	-10.58
30	-15.50	-15.51	-15.31	-14.39	-13.40	-12.38	-15.03	-13.30	-11.46
40	-18.79	-13.82	-16.59	-17.27	-15.26	-13.25	-14.02	-12.32	-13.79
50	-18.89	-18.29	-15.96	-15.41	-15.92	-17.22	-16.04	-14.00	-14.04
60	-22.58	-19.10	-19.91	-17.99	-18.19	-17.72	-17.88	-18.94	-15.89
70	-24.92	-23.42	-23.40	-23.22	-22.41	-23.42	-20.54	-17.53	-21.26

DATE- MAY 23, 1977 SITE- 5 LOOK- 5

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-8.92	-4.84	-5.03	0.48	-5.72	-4.16	-3.29	-2.55	0.
20	-10.29	-5.04	-9.08	-4.98	-6.15	-4.32	-4.25	-2.14	-4.80
30	-13.95	-4.35	-7.51	-4.97	-8.85	-11.63	-6.71	-7.05	-5.18
40	-11.40	-9.12	-6.24	-10.25	-7.45	-9.26	-10.59	-10.13	-6.94
50	-15.36	-14.64	-16.42	-12.00	-10.32	-9.82	-10.82	-12.24	-11.49
60	-16.55	-17.00	-14.15	-12.36	-13.63	-11.44	-13.24	-9.47	-15.34
70	-24.73	-20.01	-20.07	-16.11	-14.94	-19.43	-20.16	-15.87	-14.62
HV ANGLE									
10	-22.09	-18.96	-17.22	-19.20	-14.11	-11.78	-12.35	-17.79	-12.61
20	-22.23	-13.56	-16.56	-15.76	-16.10	-18.20	-16.02	-12.34	-11.94
30	-24.25	-19.93	-20.25	-19.63	-16.23	-15.00	-12.74	-11.79	-15.12
40	-20.76	-20.09	-19.67	-19.39	-15.18	-15.08	-16.20	-14.37	-15.38
50	-24.92	-25.44	-20.85	-17.48	-18.37	-18.47	-16.99	-16.26	-15.47
60	-27.20	-25.43	-25.37	-25.08	-20.61	-22.01	-23.33	-17.47	-17.48
70	-34.45	-29.38	-28.69	-28.54	-25.53	-25.57	-24.82	-22.44	-23.23
VV ANGLE									
10	-2.65	-1.85	-2.62	3.32	-3.92	-1.87	1.44	3.84	5.94
20	-4.69	-1.57	-6.36	-0.60	-2.01	-2.37	-2.13	-0.82	-3.74
30	-10.68	-1.99	-1.92	-1.21	-4.88	-2.67	0.28	-5.81	-1.23
40	-4.83	-4.98	-3.28	-7.76	-2.98	-6.51	-5.27	-5.20	-2.91
50	-8.76	-10.05	-12.77	-6.60	-7.63	-6.62	-7.40	-10.37	-7.88
60	-12.98	-12.41	-13.28	-10.40	-11.73	-9.22	-5.92	-6.92	-9.34
70	-18.67	-16.81	-16.70	-10.86	-13.96	-16.37	-12.75	-10.53	-10.74
VH ANGLE									
10	-19.72	-17.76	-17.03	-18.75	-13.21	-12.94	-13.27	-15.07	-14.27
20	-17.54	-14.46	-19.07	-15.32	-18.14	-16.90	-16.45	-14.44	-12.01
30	-23.04	-20.09	-20.77	-18.93	-15.82	-18.50	-16.32	-12.30	-14.21
40	-17.64	-18.69	-18.05	-18.24	-14.80	-15.01	-16.73	-12.80	-15.20
50	-19.69	-24.94	-21.71	-18.08	-19.18	-18.00	-17.56	-16.24	-15.67
60	-24.27	-25.08	-24.86	-23.75	-21.98	-23.01	-24.10	-19.28	-18.32
70	-32.01	-28.67	-28.19	-29.84	-26.17	-26.87	-24.29	-21.86	-23.76

DATE- MAY 23, 1977 SITE- 5 LOOK- 6

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-5.80	-4.20	-2.37	0.02	-2.94	-1.09	-6.62	-2.59	-5.46
20	-10.39	-9.68	-10.03	-6.01	-7.12	-5.68	-6.11	-2.40	-7.86
30	-8.75	-10.27	-9.00	-5.51	-4.51	-5.63	-11.28	-5.79	-5.75
40	-11.13	-11.20	-8.92	-7.81	-8.95	-7.46	-7.09	-5.16	-8.47
50	-13.62	-16.65	-12.40	-8.61	-8.26	-10.85	-10.06	-15.99	-9.34
60	-15.47	-15.85	-16.41	-11.08	-12.24	-13.09	-12.92	-13.30	-13.47
70	-23.14	-20.44	-18.54	-17.82	-15.72	-16.31	-18.18	-16.56	-16.28
HV ANGLE									
10	-22.33	-18.61	-16.78	-15.56	-16.53	-13.55	-17.08	-13.69	-10.78
20	-18.59	-20.80	-21.34	-19.87	-16.99	-17.93	-15.57	-12.15	-15.41
30	-21.93	-20.89	-17.39	-19.31	-16.49	-17.62	-18.60	-19.75	-10.65
40	-21.26	-18.55	-21.64	-19.95	-17.76	-19.92	-14.55	-11.98	-16.16
50	-24.75	-21.46	-20.09	-18.88	-20.97	-18.67	-19.92	-15.56	-17.74
60	-27.60	-24.52	-24.28	-23.01	-22.28	-24.54	-20.82	-19.99	-17.08
70	-34.70	-30.90	-25.49	-25.09	-26.93	-26.08	-24.60	-22.44	-19.83
VV ANGLE									
10	-0.05	-0.08	0.17	4.53	1.44	4.07	-0.94	1.35	0.59
20	-5.25	-4.57	-5.34	-1.23	-2.03	0.55	-2.20	0.29	-3.24
30	-5.64	-5.86	-6.12	-0.32	-0.08	-2.65	-4.07	-1.42	-1.08
40	-4.77	-8.41	-4.05	-4.10	-5.32	-3.16	-2.50	-4.28	-4.71
50	-8.58	-9.89	-9.50	-3.00	-4.28	-7.70	-6.49	-4.90	-6.07
60	-11.41	-11.36	-11.17	-6.84	-9.11	-9.38	-8.80	-7.79	-8.00
70	-17.50	-17.34	-16.16	-15.31	-14.81	-11.37	-10.43	-16.03	-11.16
VH ANGLE									
10	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
20	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
30	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
40	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
50	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
60	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00
70	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00	99.00

DATE- MAY 25, 1977 SITE- 6 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-15.67	-16.77	-16.38	-16.13	-14.33	-11.35	-12.46	-16.78	-13.78
20	-18.69	-16.18	-18.17	-15.78	-11.78	-15.67	-9.99	-12.23	-13.81
30	-21.26	-19.45	-14.99	-17.75	-13.33	-16.54	-12.38	-15.27	-15.83
40	-21.92	-20.26	-19.78	-21.57	-21.80	-18.86	-17.44	-17.65	-22.18
50	-24.85	-23.22	-23.90	-21.63	-21.78	-23.53	-19.99	-18.69	-22.55
60	-29.01	-26.56	-26.09	-24.69	-25.38	-27.68	-26.12	-25.52	-24.43
70	-33.36	-31.07	-32.59	-29.77	-29.82	-30.19	-30.49	-28.52	-29.38

HV ANGLE									
10	-25.47	-26.39	-26.35	-27.40	-25.76	-24.13	-25.28	-22.98	-20.68
20	-29.13	-26.92	-27.84	-25.97	-28.58	-26.81	-24.44	-22.60	-20.75
30	-27.97	-29.05	-29.30	-29.38	-29.77	-28.49	-22.58	-23.85	-24.41
40	-31.98	-29.93	-27.86	-30.06	-30.84	-27.53	-26.63	-25.40	-25.17
50	-30.62	-31.30	-32.48	-31.58	-30.17	-29.64	-27.40	-27.01	-29.02
60	-33.73	-33.79	-34.67	-32.86	-32.36	-36.93	-29.74	-28.32	-30.08
70	-38.53	-37.44	-37.69	-35.16	-36.44	-35.70	-34.22	-33.25	-35.32

VV ANGLE									
10	-10.99	-15.00	-17.63	-14.65	-11.27	-8.60	-8.45	-10.10	-9.31
20	-16.86	-15.62	-18.40	-11.35	-8.66	-11.24	-4.76	-8.21	-10.48
30	-17.65	-17.02	-15.91	-13.11	-13.55	-14.79	-7.01	-14.11	-14.05
40	-16.42	-15.19	-15.60	-16.58	-18.46	-14.91	-13.68	-13.26	-17.73
50	-22.36	-20.83	-20.50	-19.30	-17.22	-17.25	-13.41	-13.99	-16.69
60	-27.07	-21.33	-23.29	-19.61	-20.35	-21.07	-19.19	-21.32	-22.58
70	-27.00	-25.40	-27.00	-23.59	-24.90	-23.01	-24.44	-22.82	-25.03

VH ANGLE									
10	-26.61	-25.20	-28.14	-26.24	-31.12	-28.92	-26.11	-24.83	-22.08
20	-30.52	-26.34	-29.20	-26.79	-31.39	-26.84	-24.40	-24.37	-22.91
30	-27.95	-28.52	-28.29	-28.30	-31.02	-29.21	-25.09	-26.63	-25.63
40	-31.06	-29.24	-29.25	-28.06	-29.98	-29.74	-27.63	-25.37	-25.36
50	-30.11	-30.43	-33.07	-29.77	-31.66	-30.29	-27.74	-27.56	-29.42
60	-34.46	-32.67	-35.27	-30.94	-32.66	-36.12	-32.46	-29.83	-29.49
70	-39.16	-39.79	-37.88	-32.82	-36.85	-37.37	-35.11	-32.06	-35.93

DATE- MAY 25, 1977 SITE- 6 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-19.83	-12.71	-18.11	-17.89	-18.67	-17.30	-19.97	-17.87	-16.51
20	-22.36	-21.95	-20.54	-17.78	-20.86	-18.93	-22.08	-16.01	-21.00
30	-21.83	-21.20	-22.05	-18.73	-19.18	-21.07	-19.53	-21.82	-17.85
40	-20.97	-20.84	-21.93	-21.55	-20.78	-21.31	-19.56	-19.12	-20.46
50	-23.75	-23.84	-22.60	-20.66	-22.24	-20.90	-23.59	-22.82	-22.94
60	-26.95	-25.83	-26.33	-24.99	-24.46	-24.55	-22.82	-24.19	-24.31
70	-30.39	-31.64	-31.58	-28.94	-29.70	-28.74	-29.65	-27.52	-29.21
HV ANGLE									
10	-28.36	-28.81	-30.33	-28.98	-27.79	-26.93	-25.76	-23.20	-20.14
20	-29.51	-23.71	-27.03	-27.65	-29.34	-29.14	-27.32	-21.97	-24.11
30	-31.47	-30.24	-28.30	-28.08	-28.21	-28.76	-25.23	-22.81	-26.16
40	-31.05	-29.54	-32.23	-29.61	-28.92	-29.22	-26.06	-24.01	-25.64
50	-32.20	-30.66	-34.20	-31.95	-31.18	-31.79	-29.56	-26.64	-27.95
60	-33.38	-35.65	-33.72	-33.19	-33.93	-35.42	-31.48	-28.79	-30.97
70	-37.47	-36.59	-37.71	-35.88	-40.74	-41.77	-35.15	-32.95	-34.65
VV ANGLE									
10	-18.92	-12.01	-17.07	-18.80	-15.94	-14.89	-15.77	-13.95	-13.65
20	-19.54	-20.05	-18.37	-14.22	-16.59	-14.57	-17.98	-13.38	-18.50
30	-19.92	-16.61	-22.69	-17.33	-17.74	-22.07	-15.38	-17.04	-16.01
40	-21.64	-19.49	-22.75	-19.66	-23.25	-16.83	-23.92	-17.08	-18.68
50	-22.08	-21.67	-21.90	-19.27	-21.69	-22.71	-22.37	-19.87	-21.68
60	-25.63	-24.64	-26.24	-23.10	-22.07	-21.84	-20.29	-22.16	-23.91
70	-28.69	-30.69	-30.24	-27.02	-30.49	-28.48	-27.07	-25.80	-28.42
VH ANGLE									
10	-29.48	-25.88	-30.98	-28.30	-27.27	-27.36	-28.25	-25.40	-20.91
20	-29.64	-24.70	-26.36	-27.91	-29.53	-29.04	-26.44	-24.62	-21.42
30	-30.05	-30.46	-29.05	-28.23	-28.01	-28.54	-27.30	-25.57	-23.87
40	-29.91	-28.13	-31.50	-29.12	-28.83	-29.54	-25.75	-25.75	-23.13
50	-31.54	-29.91	-32.76	-31.48	-32.42	-32.34	-28.63	-27.77	-24.49
60	-33.41	-33.94	-33.99	-32.39	-33.40	-38.44	-29.71	-31.04	-26.05
70	-37.40	-36.65	-38.04	-35.46	-38.63	-40.59	-34.61	-34.77	-28.08

DATE- MAY 26, 1977 SITE- 6 LOOK- 3

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-17.92	-14.26	-16.16	-14.67	-12.13	-12.63	-10.28	-15.35	-13.96
20	-16.58	-15.56	-14.90	-18.20	-18.08	-18.71	-18.86	-17.12	-15.62
30	-22.19	-20.07	-20.76	-19.29	-18.53	-16.39	-18.47	-18.57	-20.32
40	-21.83	-21.08	-20.90	-18.93	-20.89	-19.57	-20.75	-19.22	-21.38
50	-25.33	-22.68	-23.84	-22.57	-21.08	-23.89	-20.67	-21.26	-23.37
60	-25.90	-25.26	-25.65	-24.97	-24.52	-24.81	-26.47	-23.23	-23.12
70	-30.42	-28.25	-29.04	-30.66	-28.95	-30.47	-28.61	-29.13	-27.03

HV ANGLE									
10	-28.25	-24.87	-21.99	-26.13	-26.89	-24.99	-21.18	-20.66	-21.28
20	-29.48	-23.98	-27.34	-26.29	-27.61	-22.35	-23.01	-21.00	-20.35
30	-28.99	-21.74	-26.34	-27.01	-26.94	-27.45	-24.27	-21.69	-22.57
40	-29.63	-28.44	-29.15	-25.49	-27.81	-27.58	-24.80	-23.40	-22.94
50	-30.26	-28.04	-30.89	-31.06	-28.49	-28.33	-26.80	-24.81	-25.73
60	-32.78	-32.22	-31.43	-31.02	-33.09	-31.49	-31.33	-25.42	-27.49
70	-35.74	-34.80	-34.28	-34.13	-35.89	-36.15	-32.72	-29.47	-34.91

VV ANGLE									
10	-16.84	-12.96	-15.76	-12.25	-13.45	-11.87	-7.74	-9.47	-10.28
20	-15.92	-15.62	-12.39	-13.85	-14.14	-13.12	-13.78	-12.57	-12.22
30	-17.42	-16.53	-17.04	-15.80	-16.86	-16.27	-12.40	-13.74	-15.49
40	-18.65	-17.63	-19.93	-15.04	-17.31	-16.89	-15.95	-15.70	-15.53
50	-22.27	-18.28	-19.97	-18.49	-20.34	-19.51	-14.97	-14.79	-18.35
60	-21.77	-21.21	-24.09	-22.97	-20.75	-20.21	-19.94	-17.24	-19.85
70	-26.97	-24.73	-25.28	-24.02	-25.19	-22.07	-21.79	-22.91	-25.31

VH ANGLE									
10	-25.73	-24.00	-24.39	-25.52	-27.04	-24.52	-21.06	-22.40	-21.56
20	-27.06	-23.31	-27.67	-25.34	-28.48	-25.74	-24.28	-21.81	-21.33
30	-28.05	-22.57	-27.06	-25.59	-26.73	-27.54	-23.11	-24.29	-24.26
40	-30.32	-29.53	-30.28	-25.55	-30.28	-27.36	-23.96	-22.07	-23.89
50	-30.00	-27.80	-29.67	-27.93	-28.52	-28.69	-26.46	-25.25	-24.69
60	-33.11	-32.63	-32.19	-30.36	-32.55	-32.15	-29.39	-28.03	-27.91
70	-35.38	-33.87	-34.16	-31.86	-36.77	-35.51	-33.21	-32.44	-33.96

DATE- MAY 26, 1977 SITE- 6 LOOK- 4

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-16.06	-9.22	-12.98	-14.91	-9.21	-10.41	-10.31	-15.36	-17.18
20	-22.36	-21.73	-18.22	-21.31	-16.70	-20.93	-18.26	-19.24	-19.96
30	-22.32	-22.38	-22.22	-20.40	-21.31	-25.50	-22.55	-21.68	-22.20
40	-24.39	-23.74	-23.57	-20.70	-21.61	-24.65	-25.53	-20.94	-25.05
50	-25.80	-22.84	-22.94	-23.99	-22.31	-26.08	-24.80	-23.94	-26.91
60	-31.47	-27.54	-30.50	-23.73	-25.56	-26.58	-26.25	-25.15	-26.65
70	-31.65	-30.91	-32.52	-31.24	-29.90	-32.92	-32.10	-29.47	-30.13

HV ANGLE									
10	-28.28	-26.49	-27.36	-27.31	-26.17	-26.28	-24.80	-21.12	-26.33
20	-24.51	-25.19	-27.16	-26.65	-26.58	-28.90	-23.33	-23.63	-22.42
30	-27.66	-25.85	-28.65	-23.78	-30.01	-27.20	-24.56	-24.84	-25.33
40	-28.23	-29.29	-30.78	-27.44	-28.95	-30.94	-27.10	-28.26	-27.11
50	-32.55	-30.29	-30.71	-29.97	-29.10	-29.59	-28.64	-29.30	-29.97
60	-32.56	-31.65	-32.20	-29.49	-33.29	-35.02	-29.93	-30.85	-31.89
70	-35.77	-33.79	-37.73	-33.28	-37.42	-37.52	-37.64	-36.48	-31.81

VV ANGLE									
10	-12.64	-6.49	-11.91	-10.15	-6.00	-3.98	-6.25	-11.25	-8.74
20	-19.88	-17.16	-17.63	-15.59	-15.30	-18.03	-14.43	-16.15	-16.70
30	-22.54	-17.66	-20.77	-19.20	-17.58	-21.64	-18.73	-15.93	-18.09
40	-23.07	-21.54	-21.11	-18.84	-22.49	-20.29	-17.65	-18.36	-21.03
50	-25.40	-21.28	-23.76	-22.11	-22.48	-21.09	-23.30	-19.97	-23.03
60	-26.89	-25.13	-26.75	-22.72	-23.73	-26.70	-26.73	-21.62	-25.23
70	-31.24	-29.50	-32.37	-28.71	-30.32	-31.80	-31.12	-30.03	-26.80

VH ANGLE									
10	-27.99	-25.83	-27.55	-24.19	-27.76	-23.97	-24.13	-22.88	-23.54
20	-24.56	-26.29	-24.60	-24.65	-28.43	-24.83	-27.16	-25.93	-24.86
30	-29.31	-27.44	-27.70	-25.62	-29.76	-30.23	-26.49	-23.67	-24.83
40	-31.11	-29.08	-29.65	-25.82	-30.57	-31.58	-28.00	-27.42	-25.83
50	-30.73	-29.14	-31.42	-26.53	-32.04	-29.39	-28.26	-29.02	-28.22
60	-33.28	-31.71	-32.30	-27.56	-33.03	-34.64	-28.54	-29.99	-30.18
70	-37.09	-34.16	-36.65	-29.84	-37.53	-37.79	-38.52	-33.61	-32.63

DATE- MAY 26, 1977 SITE- 6 LOOK- 5

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-17.16	-16.18	-12.96	-15.14	-13.33	-21.41	-18.84	-11.44	-16.64
20	-25.21	-22.27	-19.10	-18.61	-13.70	-22.46	-25.79	-17.87	-25.03
30	-23.49	-21.16	-24.60	-21.18	-20.29	-16.86	-19.94	-14.98	-23.66
40	-29.47	-24.40	-21.48	-15.40	-17.04	-18.31	-21.12	-23.69	-22.02
50	-26.79	-29.99	-24.07	-23.40	-22.46	-21.93	-23.66	-25.78	-22.78
60	-36.90	-30.48	-31.71	-28.76	-27.51	-25.97	-27.78	-27.66	-27.20
70	-39.45	-38.65	-35.07	-32.80	-32.96	-33.98	-35.03	-31.85	-36.07

HV ANGLE									
10	-29.75	-31.39	-29.73	-25.19	-32.22	-27.34	-26.98	-27.46	-24.39
20	-34.95	-31.41	-29.90	-27.51	-30.22	-30.47	-30.50	-32.31	-26.30
30	-34.21	-30.95	-34.56	-27.61	-31.05	-31.84	-35.15	-30.45	-27.31
40	-34.12	-32.62	-37.84	-29.88	-31.30	-37.13	-34.16	-30.70	-29.03
50	-42.53	-40.72	-41.37	-28.32	-32.79	-38.30	-37.56	-31.04	-30.29
60	-44.03	-40.73	-41.34	-29.96	-43.47	-44.57	-40.52	-32.22	-31.53
70	-50.93	-49.44	-48.85	-32.07	-49.61	-53.05	-42.97	-34.29	-34.15

VV ANGLE									
10	-17.93	-18.93	-17.94	-19.41	-18.87	-20.93	-22.47	-15.94	-22.92
20	-23.85	-22.55	-25.70	-20.81	-20.90	-24.71	-22.37	-24.17	-25.92
30	-23.25	-25.30	-27.90	-21.09	-30.61	-24.25	-26.43	-25.26	-26.33
40	-30.67	-31.25	-31.11	-21.77	-26.08	-28.23	-31.17	-26.03	-24.42
50	-30.00	-33.84	-30.91	-24.94	-26.50	-25.62	-27.52	-27.24	-28.84
60	-36.67	-32.65	-28.81	-26.07	-36.03	-36.33	-35.80	-30.35	-29.57
70	-47.22	-44.78	-39.27	-28.57	-45.79	-44.77	-39.85	-31.09	-32.02

VH ANGLE									
10	-33.76	-30.89	-30.87	-23.84	-32.01	-34.53	-32.52	-26.65	-25.91
20	-31.87	-28.22	-32.72	-23.96	-37.77	-35.30	-33.13	-27.99	-27.83
30	-37.25	-38.43	-35.03	-24.68	-41.04	-42.03	-37.19	-29.00	-28.72
40	-37.65	-39.26	-42.58	-25.29	-40.96	-42.50	-37.76	-29.26	-29.07
50	-45.06	-44.01	-45.40	-25.85	-43.33	-45.02	-39.11	-31.37	-30.75
60	-46.85	-49.70	-35.10	-26.58	-46.74	-50.25	-38.68	-34.36	-33.35
70	-54.46	-52.77	-52.26	-28.27	-52.52	-53.66	-39.90	-36.46	-35.38

DATE- MAY 28, 1977 SITE- 7 LOOK- 1

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-4.08	-4.67	-4.99	-2.40	-2.90	-4.85	-5.01	-3.74	-8.65
20	-13.29	-10.07	-7.71	-9.86	-12.62	-12.55	-11.34	-7.95	-9.92
30	-10.49	-17.82	-13.82	-14.55	-10.45	-11.72	-11.00	-11.76	-14.47
40	-15.56	-15.54	-17.14	-12.30	-14.42	-12.29	-16.71	-13.51	-12.16
50	-19.16	-16.22	-18.19	-17.31	-17.14	-15.11	-12.17	-15.16	-16.25
60	-18.52	-21.35	-20.91	-19.35	-16.16	-18.24	-18.22	-15.49	-16.74
70	-22.87	-20.25	-21.08	-18.18	-18.23	-19.53	-21.02	-18.52	-21.93
HV ANGLE									
10	-25.89	-23.20	-27.84	-27.06	-24.29	-23.91	-20.39	-18.75	-22.00
20	-27.97	-28.74	-28.61	-24.67	-24.57	-23.54	-21.58	-19.63	-19.39
30	-30.13	-27.81	-31.44	-29.05	-25.31	-25.06	-25.04	-22.29	-25.36
40	-28.74	-28.70	-32.67	-30.53	-27.74	-26.13	-25.92	-23.96	-22.29
50	-31.69	-31.10	-31.45	-29.15	-27.60	-28.45	-24.85	-23.68	-23.44
60	-32.11	-33.30	-33.77	-30.59	-28.91	-27.80	-27.02	-23.78	-24.01
70	-36.33	-33.97	-35.61	-31.69	-32.07	-31.21	-28.92	-27.54	-28.72
VV ANGLE									
10	-11.50	-3.55	-3.77	-2.01	-2.53	-2.65	-5.16	-1.00	-9.28
20	-17.86	-9.45	-10.84	-13.47	-12.05	-12.73	-10.92	-7.19	-10.67
30	-12.46	-17.52	-17.42	-16.48	-13.98	-14.38	-10.59	-10.32	-14.19
40	-22.80	-20.13	-17.83	-17.06	-15.72	-17.51	-16.59	-11.60	-16.08
50	-19.69	-19.75	-19.94	-18.50	-16.60	-17.09	-15.42	-13.96	-15.76
60	-22.47	-23.24	-24.23	-19.68	-20.22	-17.88	-18.55	-17.08	-20.66
70	-26.29	-25.20	-27.48	-22.53	-23.21	-20.05	-21.85	-19.99	-21.88
VH ANGLE									
10	-28.16	-23.50	-23.40	-22.30	-25.67	-29.56	-23.62	-20.32	-19.01
20	-29.14	-30.19	-27.12	-23.99	-22.06	-23.33	-22.45	-19.95	-25.72
30	-33.18	-29.09	-31.11	-27.88	-26.70	-25.78	-25.42	-25.82	-25.71
40	-31.16	-29.46	-33.64	-27.67	-29.07	-28.61	-27.64	-23.68	-25.24
50	-32.19	-33.74	-33.86	-27.80	-30.69	-28.93	-25.99	-25.94	-26.94
60	-35.32	-36.03	-34.09	-27.67	-29.30	-28.22	-27.96	-24.94	-27.12
70	-37.59	-34.93	-38.04	-30.88	-32.85	-31.47	-29.07	-30.51	-29.92

DATE- MAY 28, 1977 SITE- 7 LOOK- 2

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-12.18	-8.38	-6.15	-6.33	-10.79	1.42	0.12	-3.59	-2.66
20	-15.13	-14.28	-13.97	-9.64	-8.83	-7.30	-7.69	-10.06	-9.97
30	-15.86	-12.77	-11.41	-11.41	-10.53	-10.92	-12.37	-10.27	-8.14
40	-15.60	-14.73	-14.79	-11.59	-10.09	-14.01	-13.45	-8.28	-13.24
50	-19.46	-16.10	-13.70	-14.16	-15.46	-14.76	-14.04	-11.76	-12.66
60	-19.23	-20.11	-12.73	-12.83	-16.75	-16.29	-17.51	-13.43	-14.73
70	-21.96	-20.71	-20.47	-21.92	-18.87	-20.14	-21.54	-18.40	-18.92
HV ANGLE									
10	-27.74	-25.43	-24.21	-28.62	-25.52	-18.05	-19.10	-20.24	-16.07
20	-28.24	-28.10	-25.44	-25.95	-28.90	-25.06	-23.30	-22.42	-19.61
30	-29.13	-29.94	-26.34	-26.35	-25.88	-25.74	-20.36	-20.36	-21.10
40	-30.30	-24.20	-27.58	-24.33	-26.61	-23.72	-23.77	-21.94	-23.41
50	-30.11	-28.58	-24.62	-27.34	-26.46	-24.71	-22.90	-22.21	-24.73
60	-31.55	-31.59	-30.42	-24.83	-26.10	-26.95	-24.81	-22.39	-25.43
70	-34.08	-34.28	-32.60	-30.99	-29.81	-28.68	-27.07	-27.12	-29.84
VV ANGLE									
10	-9.64	-15.97	-12.18	-5.23	-11.51	-3.59	-0.95	3.46	1.49
20	-15.07	-13.54	-14.48	-11.54	-9.78	-4.28	-10.89	-1.84	-8.22
30	-16.17	-14.12	-16.13	-7.05	-8.29	-8.40	-7.46	-8.34	-7.37
40	-16.74	-14.66	-16.02	-11.82	-15.89	-9.80	-11.08	-11.39	-14.70
50	-20.19	-18.17	-22.07	-13.84	-12.62	-13.71	-13.31	-10.19	-16.40
60	-20.15	-19.52	-19.96	-18.21	-15.85	-16.54	-17.64	-12.68	-17.75
70	-25.55	-24.46	-24.75	-20.37	-20.62	-21.56	-18.16	-17.92	-19.01
VH ANGLE									
10	-27.60	-25.36	-21.65	-22.03	-24.57	-23.19	-18.59	-15.10	-15.66
20	-29.01	-29.13	-27.28	-20.88	-27.98	-26.92	-22.61	-19.16	-21.06
30	-30.95	-29.63	-27.91	-22.31	-27.78	-21.39	-21.23	-20.02	-19.74
40	-29.18	-24.89	-29.03	-21.59	-30.01	-25.06	-22.85	-21.93	-20.82
50	-30.06	-29.72	-25.83	-23.41	-25.86	-26.15	-23.68	-20.97	-22.48
60	-31.30	-32.47	-29.79	-23.88	-28.78	-25.71	-24.32	-24.28	-26.01
70	-33.24	-34.31	-33.23	-25.66	-31.66	-27.92	-27.14	-27.50	-28.36

DATE- MAY 28, 1977 SITE- 7 LOOK- 3

FREQ	9	10	11	12	13	14	15	16	17
HH ANGLE									
10	-6.89	-10.26	-4.19	-3.48	0.05	-6.70	-4.01	-0.13	-2.17
20	-6.57	-7.71	-7.69	-10.93	-5.75	-6.04	-12.40	-6.88	-9.92
30	-16.65	-13.18	-14.21	-6.83	-10.09	-8.39	-9.61	-12.67	-9.35
40	-12.29	-16.64	-11.33	-14.54	-14.87	-11.76	-18.51	-9.27	-9.05
50	-16.23	-18.03	-17.10	-15.81	-12.48	-10.58	-15.37	-14.06	-14.05
60	-20.25	-15.89	-15.14	-14.45	-16.13	-14.82	-13.99	-12.06	-14.34
70	-22.19	-20.60	-20.17	-15.85	-15.10	-17.22	-16.53	-15.87	-18.43
HV ANGLE									
10	-25.58	-22.97	-24.81	-23.92	-19.88	-16.41	-16.61	-14.72	-15.37
20	-27.66	-25.53	-25.40	-23.25	-23.93	-22.50	-16.80	-16.90	-17.01
30	-28.17	-24.39	-27.26	-23.69	-22.62	-22.75	-20.38	-18.36	-17.89
40	-30.05	-25.69	-23.82	-24.42	-25.21	-24.19	-21.70	-20.49	-21.97
50	-30.29	-27.92	-27.94	-26.81	-25.79	-24.57	-21.77	-20.51	-18.66
60	-29.30	-31.47	-29.03	-24.95	-28.14	-24.72	-23.21	-21.46	-22.50
70	-31.67	-32.86	-32.37	-26.85	-27.90	-27.09	-25.88	-25.98	-27.15
VV ANGLE									
10	-3.13	-4.44	-5.06	-2.05	-4.93	-6.78	-1.94	1.56	-2.24
20	-4.57	-7.68	-8.39	-13.11	-8.72	-4.48	-5.51	-3.41	-7.37
30	-17.19	-12.17	-16.65	-5.42	-10.83	-9.04	-7.15	-7.79	-5.78
40	-13.01	-16.48	-13.07	-12.30	-9.74	-9.78	-9.96	-7.02	-11.38
50	-17.42	-17.83	-18.23	-16.35	-11.22	-13.93	-10.79	-7.74	-9.02
60	-21.16	-20.20	-16.74	-15.04	-17.05	-16.00	-14.48	-14.54	-14.69
70	-20.44	-23.10	-22.72	-18.79	-17.54	-17.90	-15.46	-16.08	-17.22
VH ANGLE									
10	-24.62	-28.10	-25.97	-20.29	-17.17	-18.52	-15.17	-18.21	-16.71
20	-27.64	-27.49	-26.67	-20.87	-24.81	-21.82	-16.39	-18.17	-17.45
30	-27.45	-26.77	-27.76	-21.84	-26.33	-21.08	-21.85	-19.40	-19.06
40	-29.97	-26.19	-26.94	-21.99	-25.49	-24.96	-22.54	-22.44	-23.67
50	-31.84	-28.06	-29.27	-22.50	-26.48	-24.82	-20.66	-20.35	-19.21
60	-30.86	-30.15	-28.56	-22.37	-30.41	-26.37	-21.94	-22.35	-20.33
70	-31.50	-33.81	-32.36	-25.43	-28.97	-25.15	-24.39	-25.75	-26.08

3.0 ICE CHARACTERIZATION DATA

Ice characterization information includes a general site description (Table 2), snow densities (Table 4), air and ice-surface temperature history (Figure 1), cross-section of the small pressure-ridge (Figure 2), salinity profiles (Figures 3-7), and thin sections of the ice sheet (Figures 8-39).

TABLE 4
 SNOW DENSITIES TAKEN AT
 SITES 77-1, 77-2, 77-4, AND 77-7

SITE NUMBER	LOOK NUMBER	DEPTH BELOW SNOW SURFACE	SNOW DENSITY (gm/cm ³)	COMMENTS
77-1	1	4	312	on ice surface
		7	276	
	2	4	376	on ice surface depth hoar
		11	296	
	3	3	288	
	4	3	348	on ice surface
		7.5	308	
77-2	1	3	352	on ice surface
		8	344	
		12	384	
		16	344	
	2	7	280	
77-4	--	8	332	
		20	356	
77-7	--	3	416	on ice surface
		9	448	
		14	448	
		15	424	

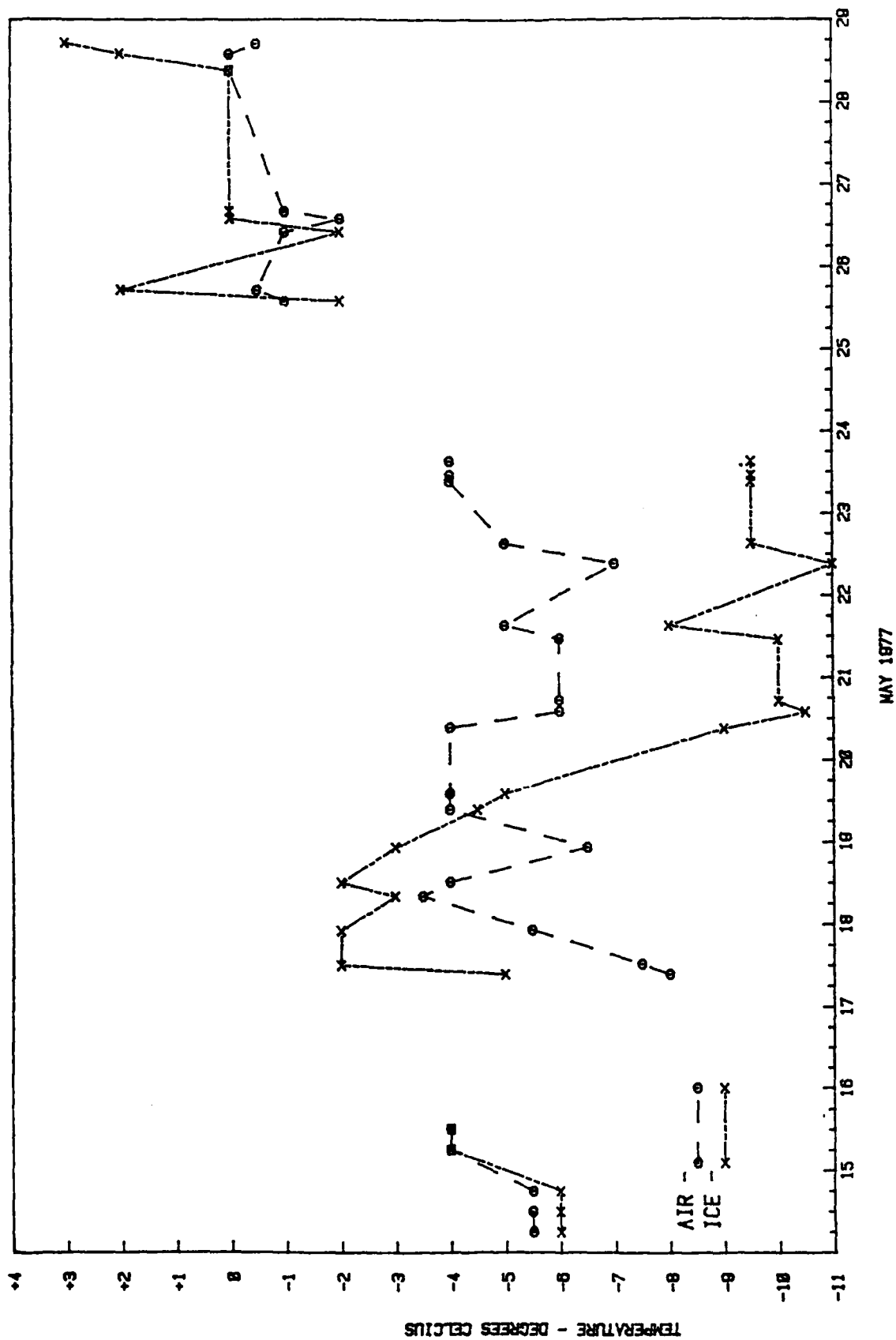


FIGURE 1: Air and Ice Surface Temperatures for the 1977 Barrow Experiment

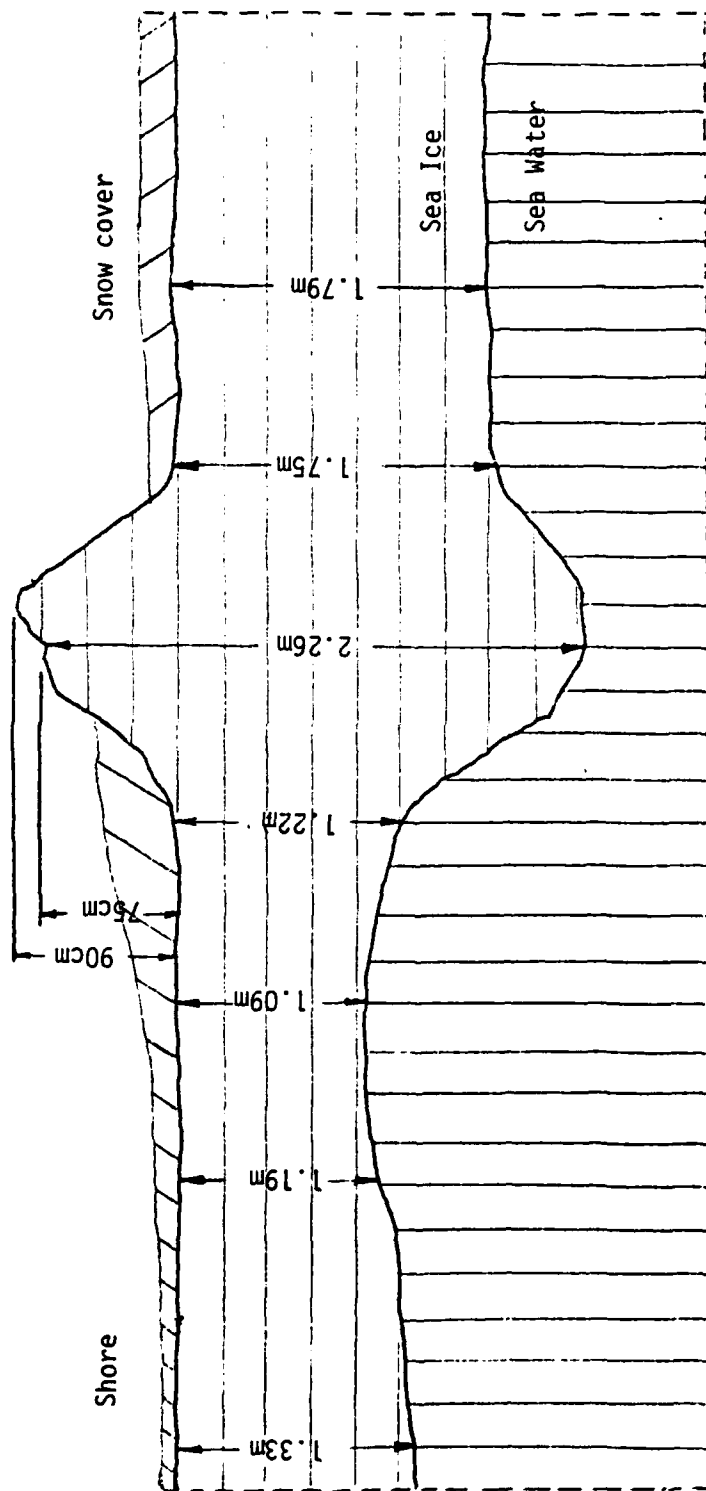


FIGURE 2: Cross section of a small first-year sea ice pressure ridge, Site 77-4.

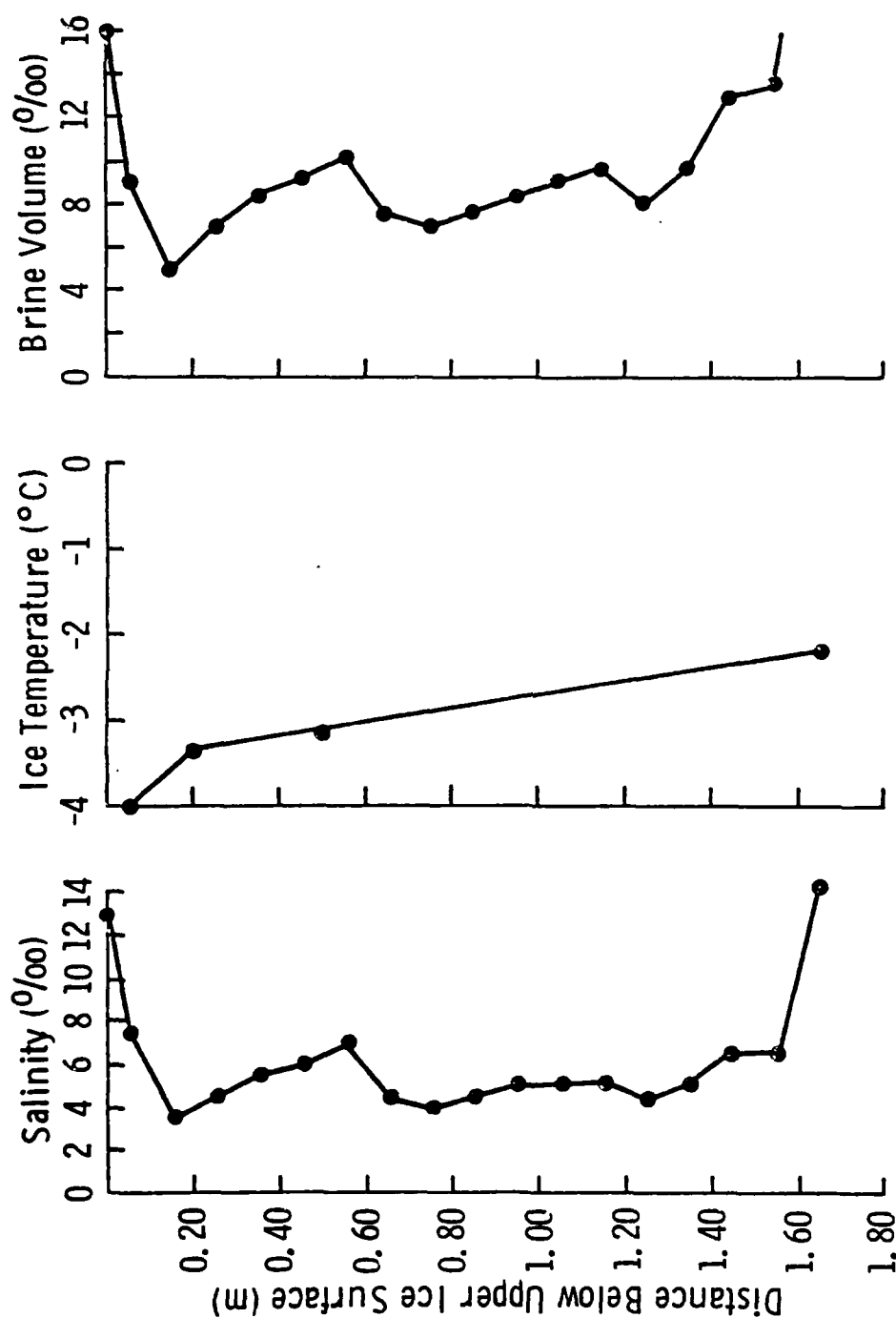


FIGURE 3: The salinity, ice temperature and brine volume profiles for the sea ice from Site 77-1 on May 14, 1977.

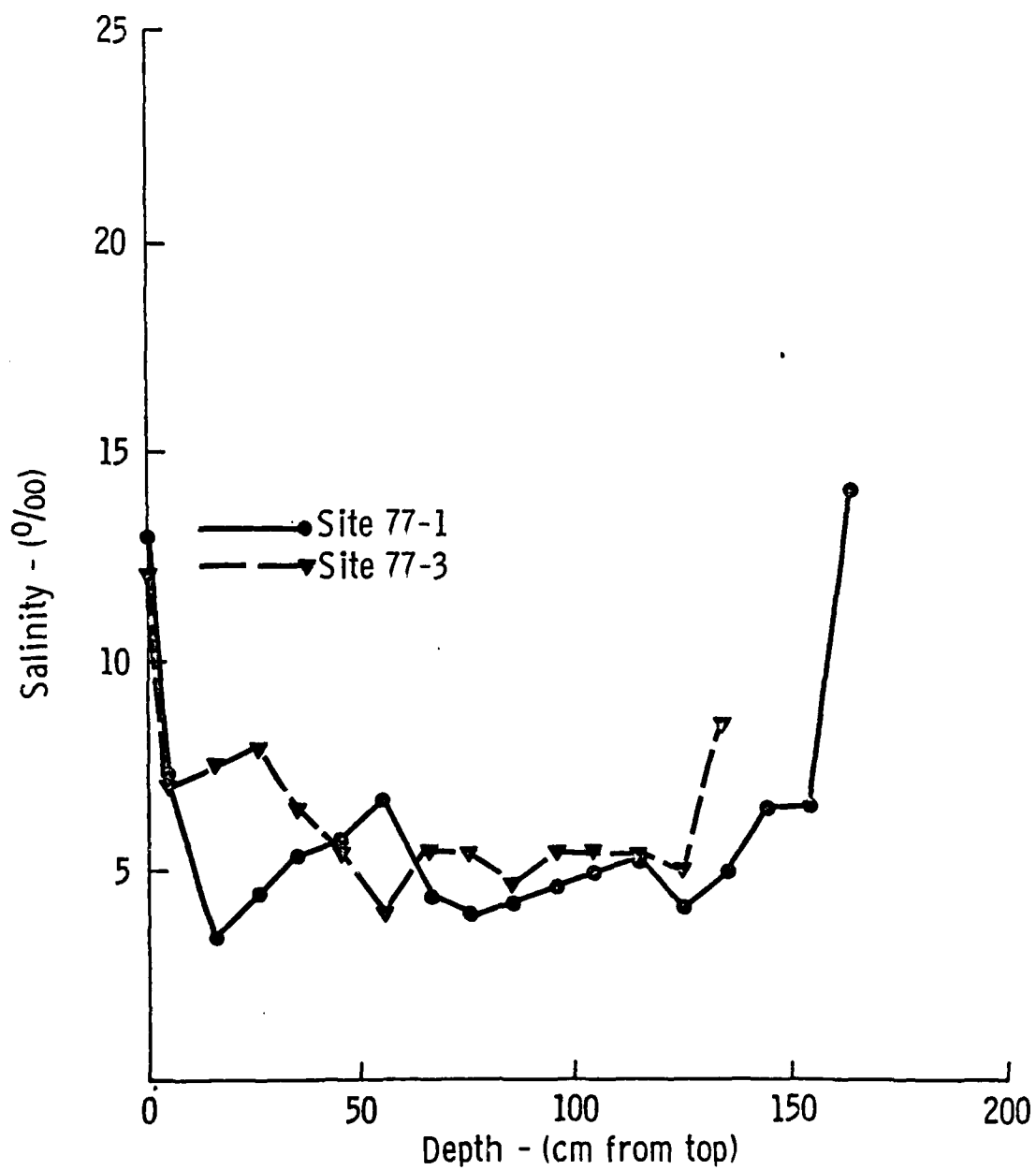


FIGURE 4: Salinity profile for Sites 77-1 and 77-3, thick first-year shore fast sea ice.

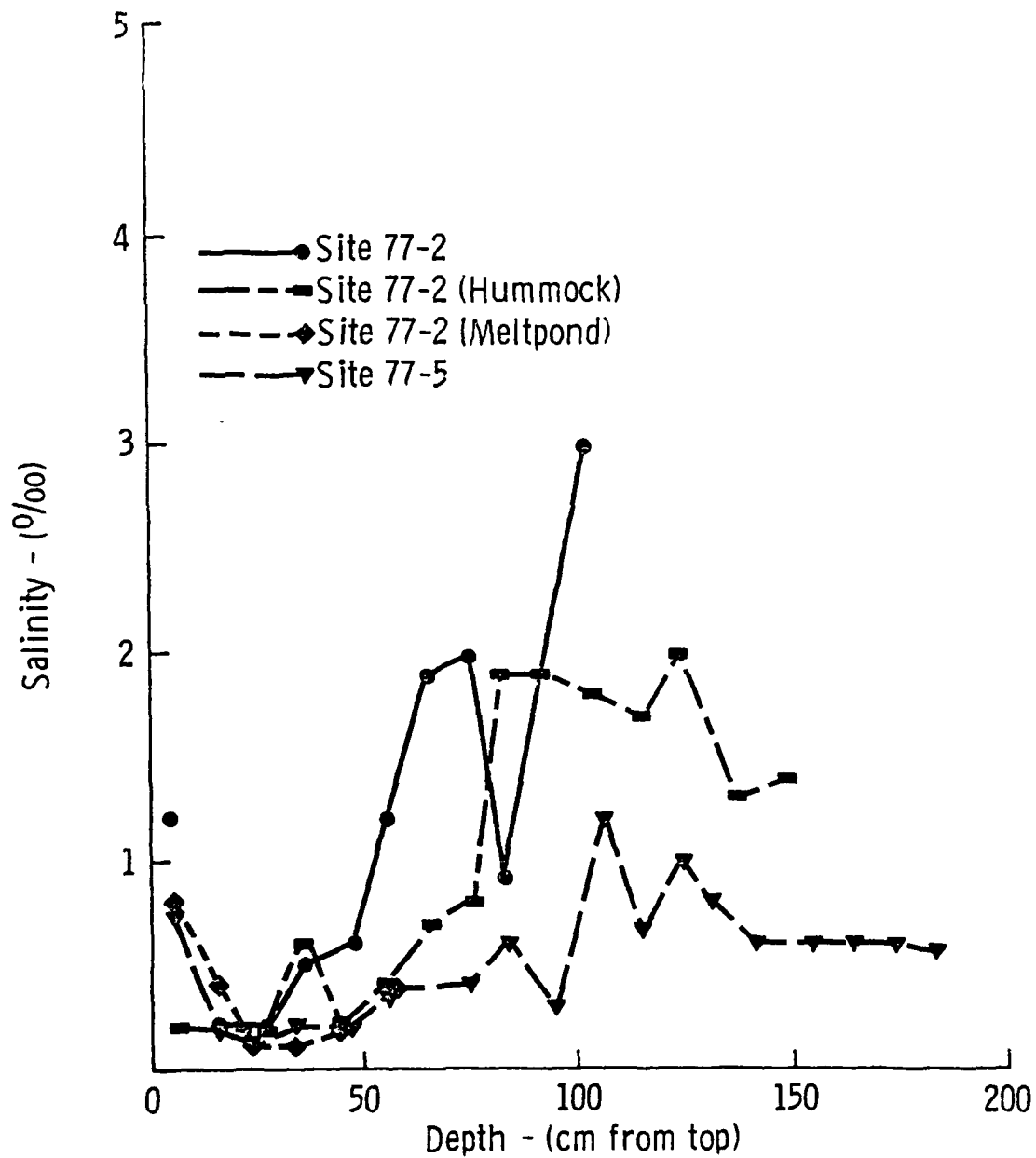


FIGURE 5: Salinity profile for Site 77-2 and Site 77-5, multiyear sea ice.

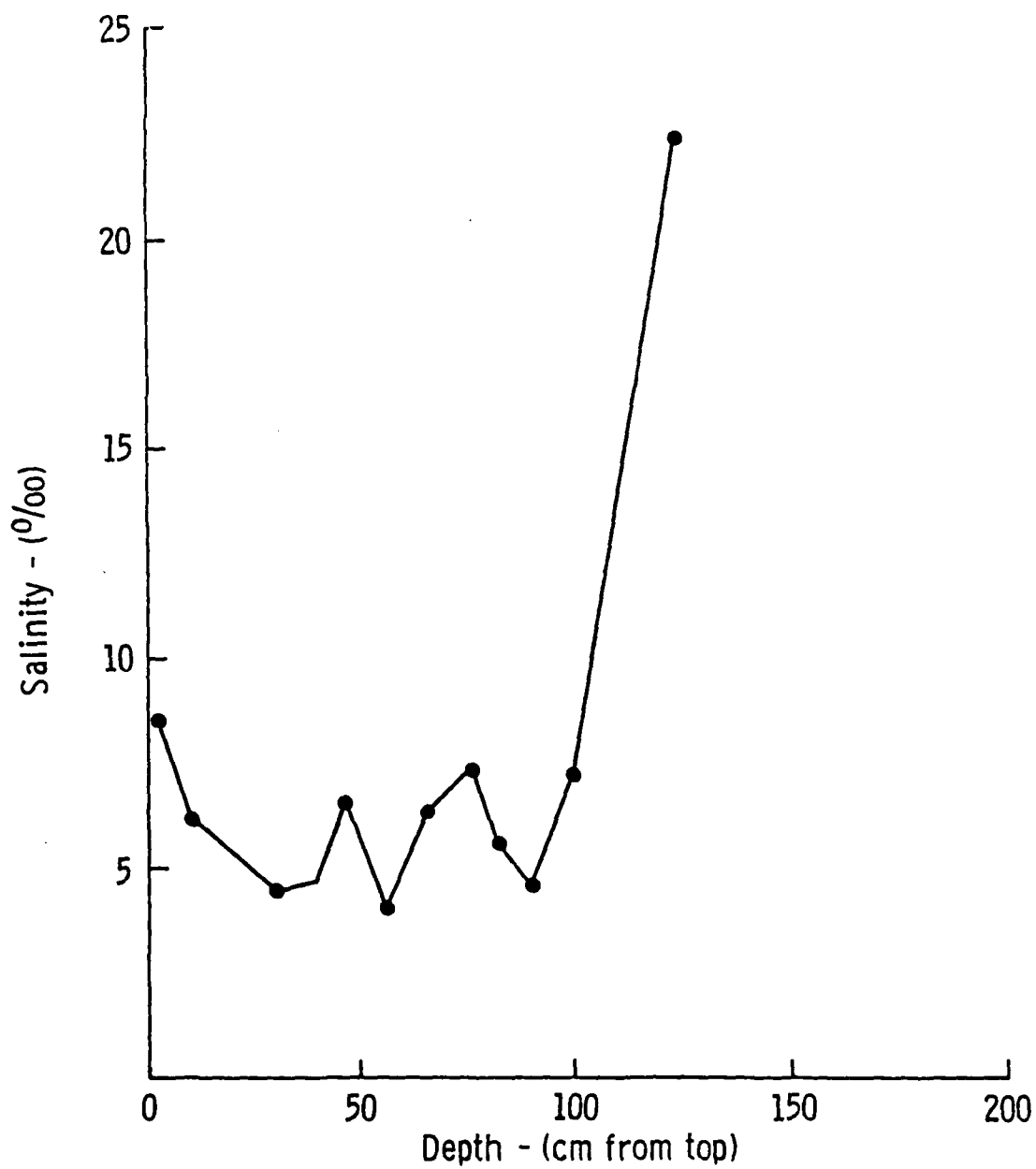


FIGURE 6: Salinity profile of Site 77-4, first-year pressure-ridged sea ice.

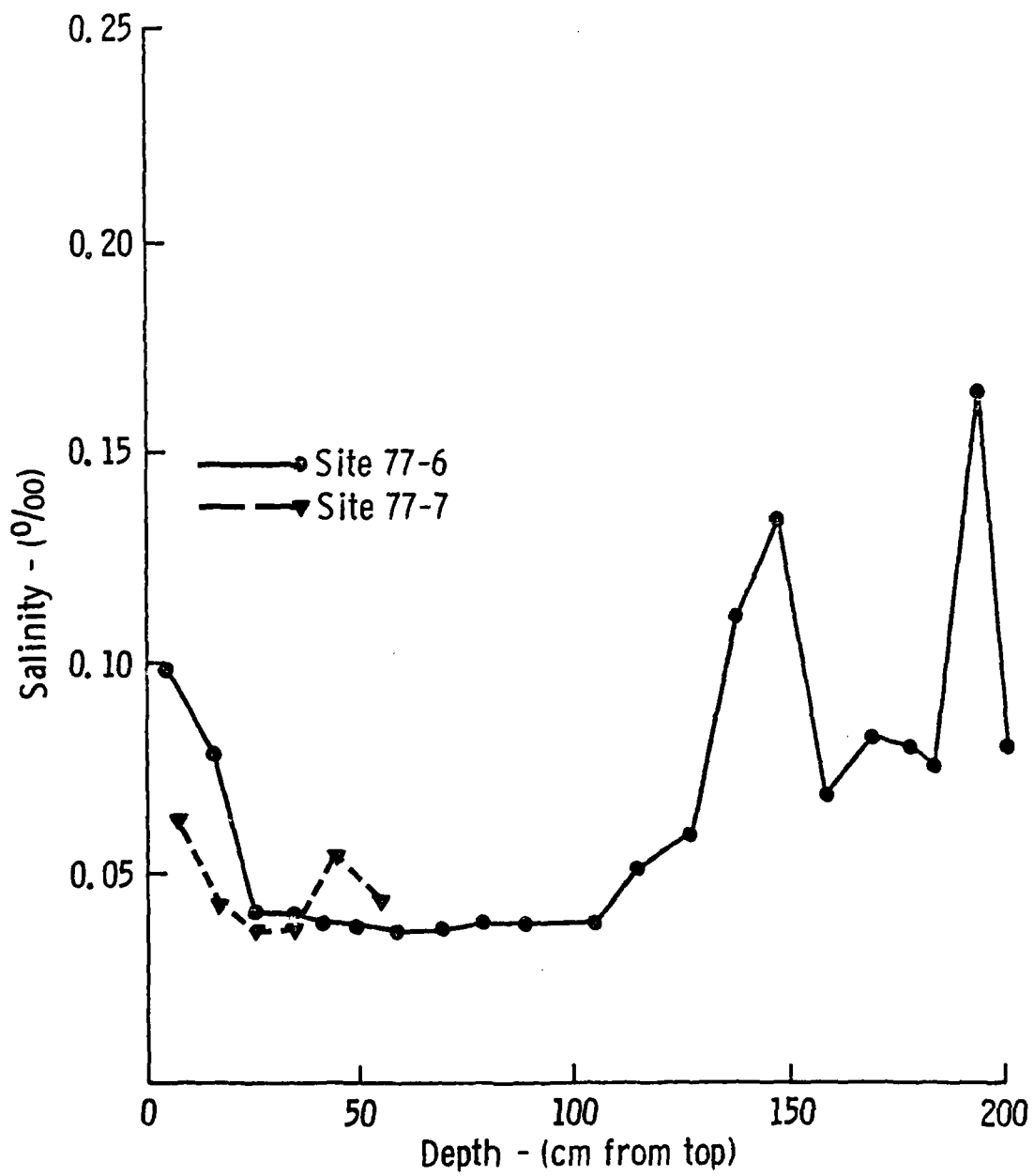


FIGURE 7: Salinity profile of Site 77-6, lake ice with an underlying layer of water, and Site 77-7, lake ice that is frozen to its mud bottom.

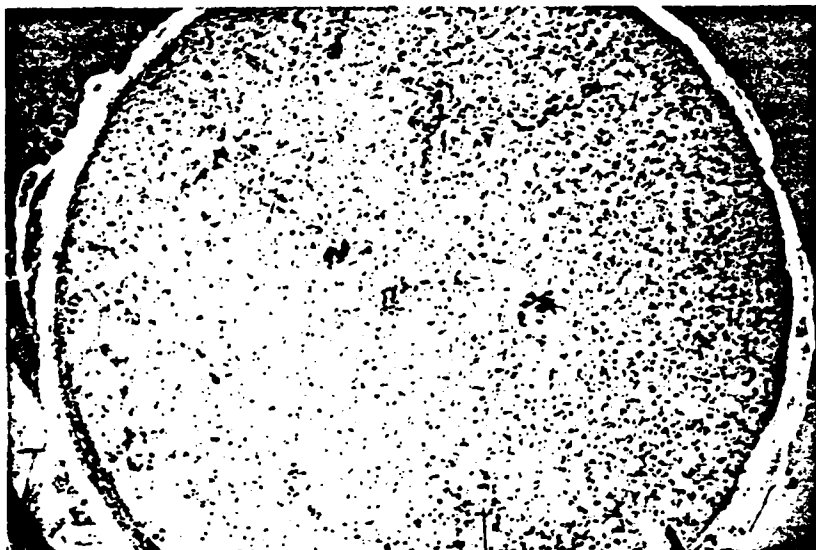


FIGURE 8: Horizontal thin section of Site 77-1 taken at depth 10 cm.

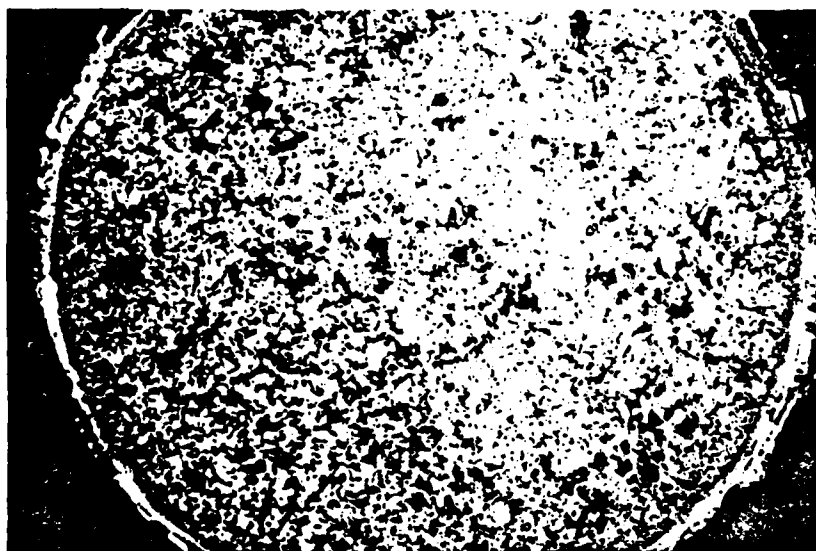


FIGURE 9: Horizontal thin section of Site 77-1 taken at 10 cm depth as viewed through polarizing filter.

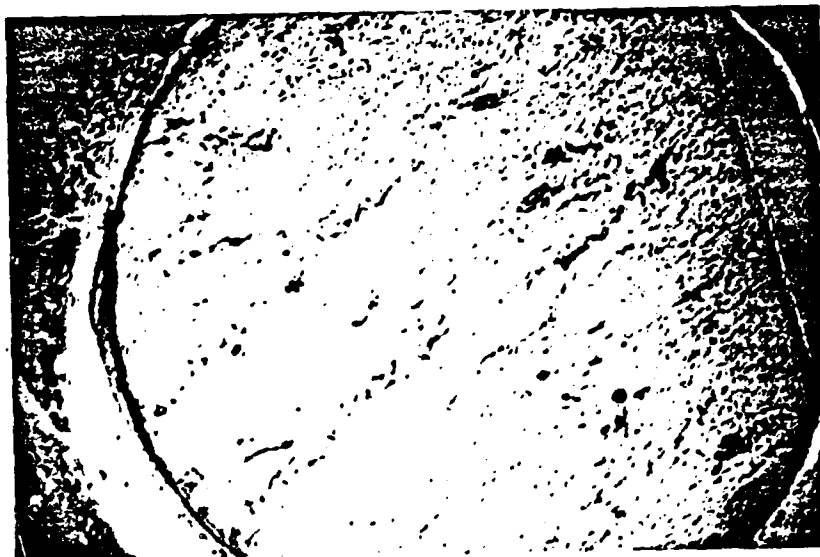


FIGURE 10: Horizontal thin section of Site 77-1 taken at 51 cm depth.

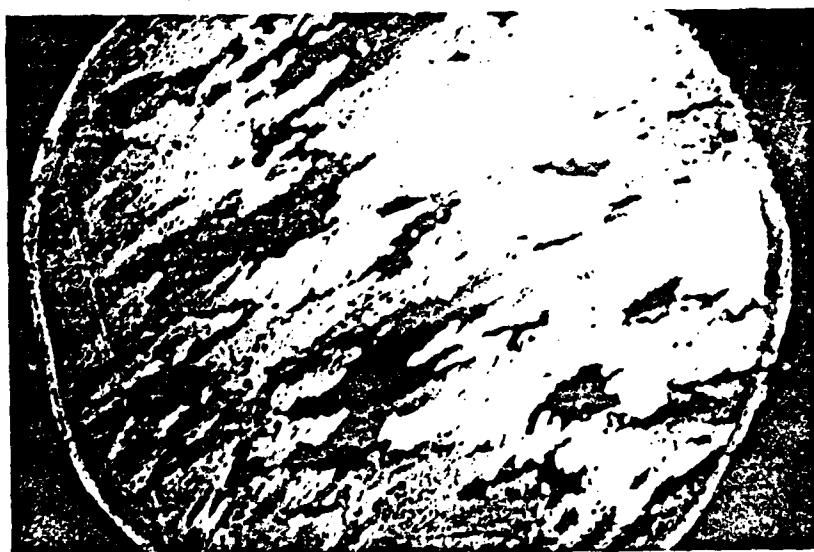


FIGURE 11: Horizontal thin section of Site 77-1 taken at 51 cm depth as viewed through polarizing filter.

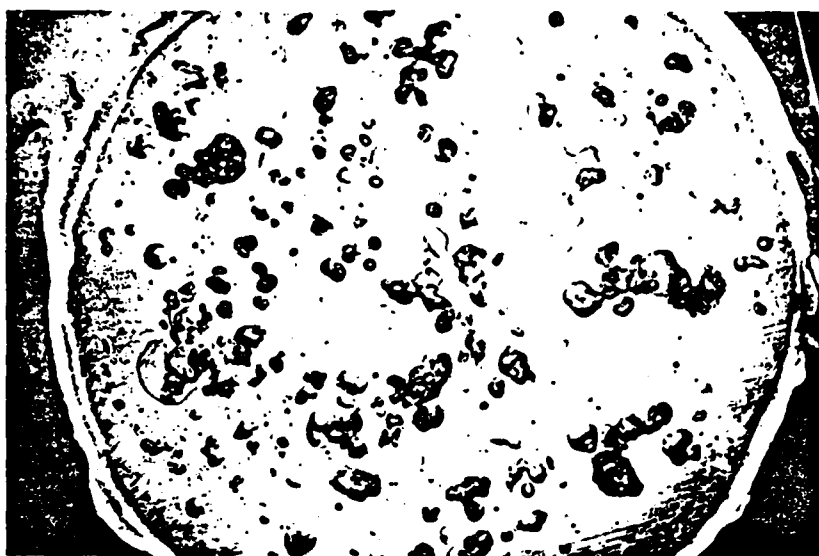


FIGURE 12: Horizontal thin section of Site 77-2 (meltpond) at 10 cm depth.

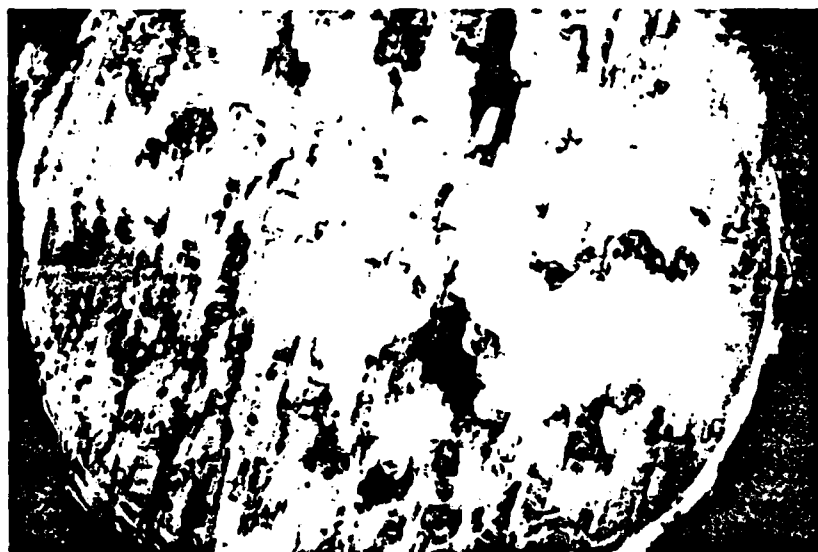


FIGURE 13: Horizontal thin section of Site 77-2 (meltpond) at 10 cm depth as viewed through polarizing filter.

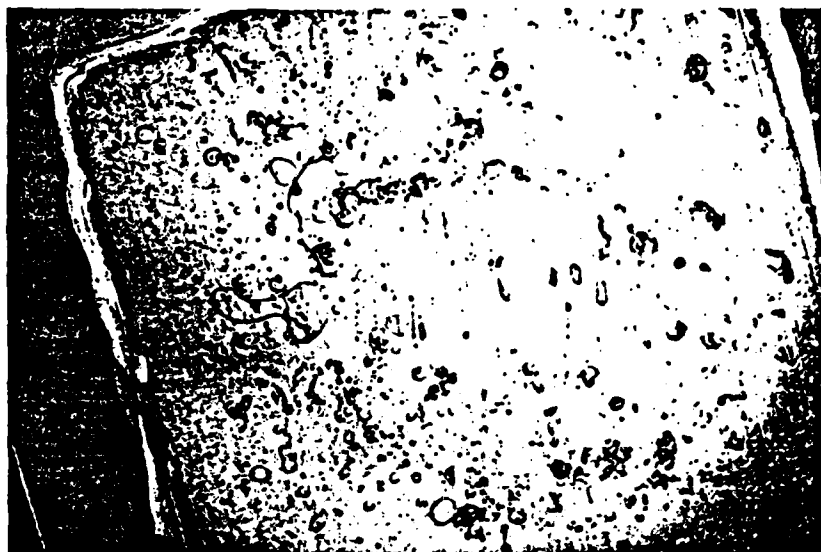


FIGURE 14: Vertical thin section of Site 77-2 (meltpond) at 78 cm depth.

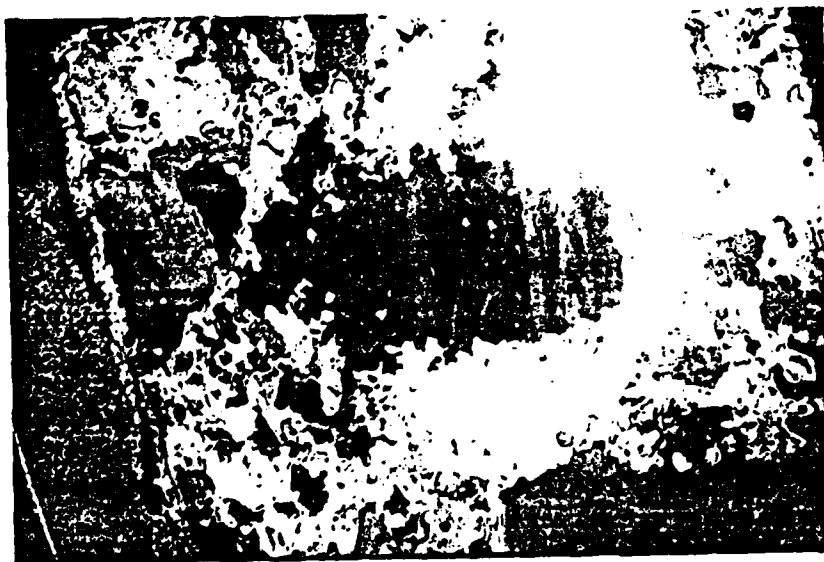


FIGURE 15: Vertical thin section of Site 77-2 (meltpond) at 78 cm depth as viewed through polarizing filter.



FIGURE 16: Horizontal thin section of Site 77-2 (meltpond) at 99 cm depth.

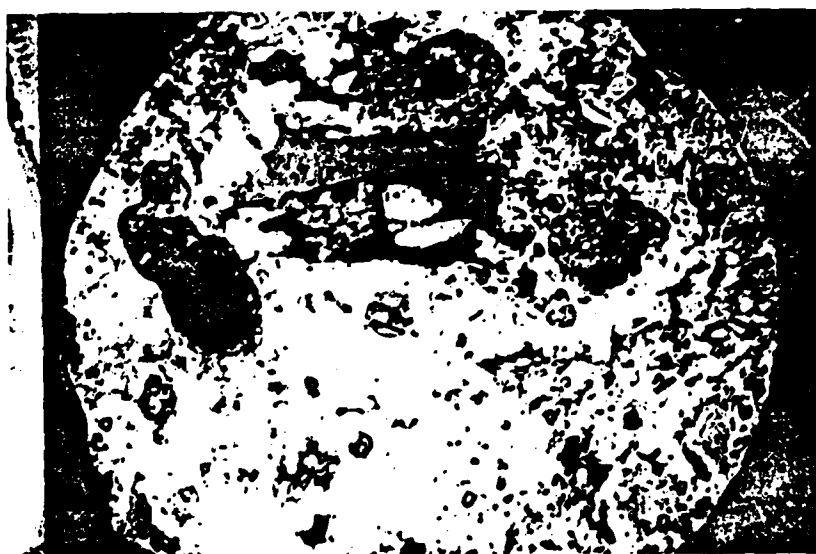


FIGURE 17: Horizontal thin section of Site 77-2 (meltpond) at 99 cm depth as viewed through polarizing filter.

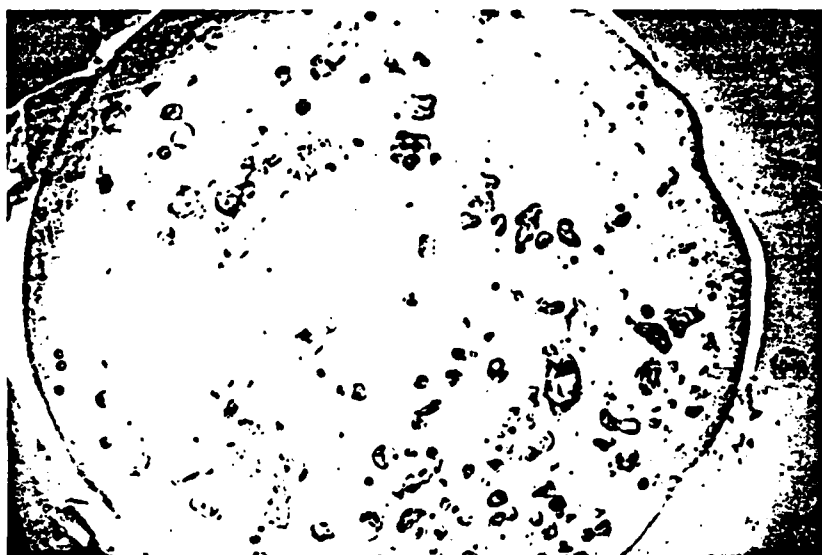


FIGURE 18: Horizontal thin section of Site 77-2 (hummock) at 5 cm depth.

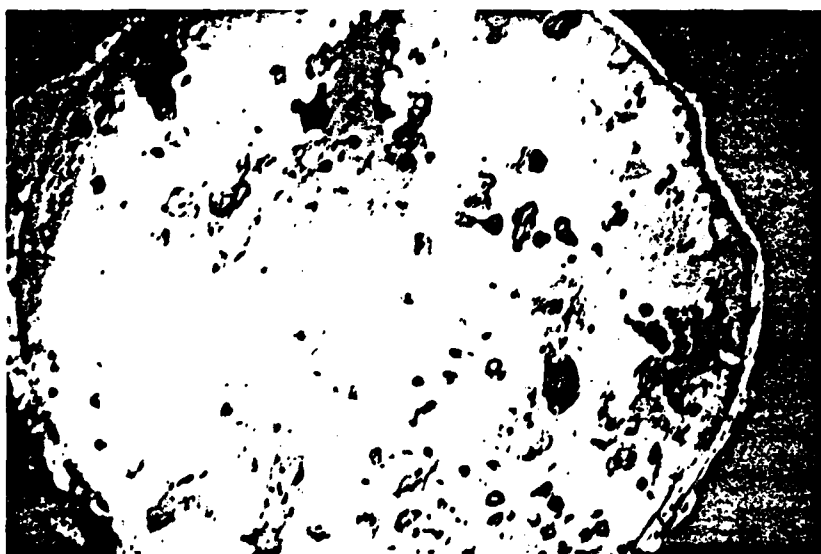


FIGURE 19: Horizontal thin section of Site 77-2 (hummock) at 5 cm depth as viewed through polarizing filter.

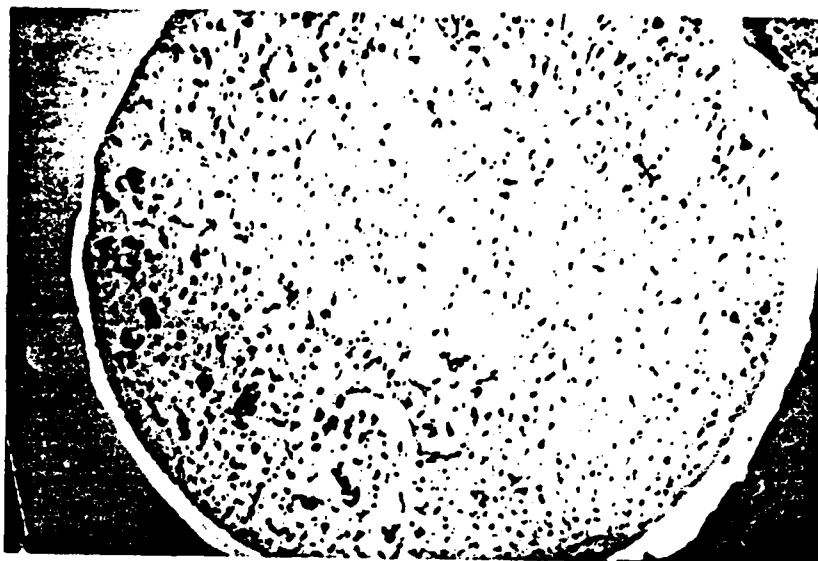


FIGURE 20: Horizontal thin section of Site 77-2 (hummock) at 140 cm depth.

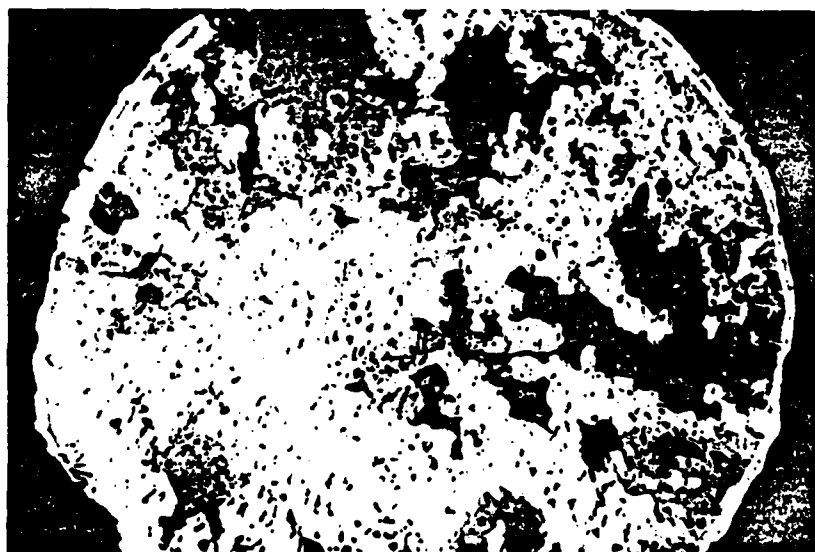


FIGURE 21: Horizontal thin section of Site 77-2 (hummock) viewed through polarizing filter.



FIGURE 22: Horizontal thin section of Site 77-3 at 15 cm depth.

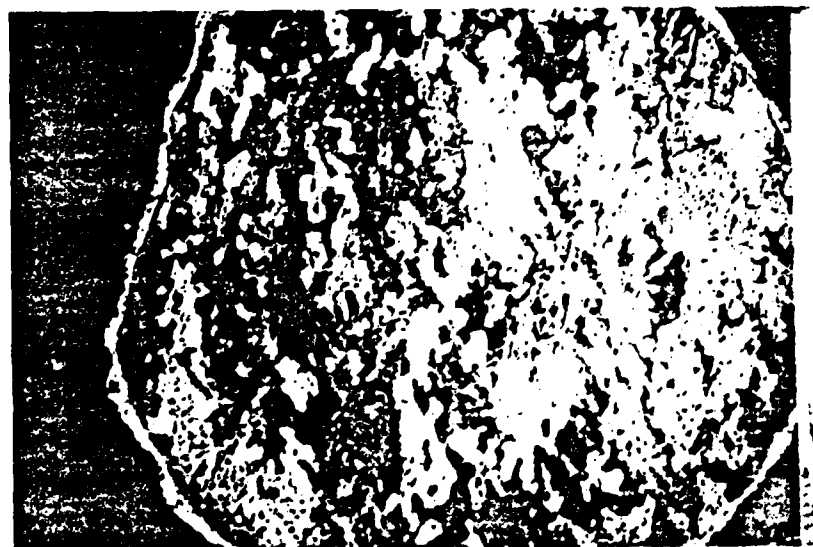


FIGURE 23: Horizontal thin section of Site 77-3 at 15 cm depth as viewed through polarizing filter.

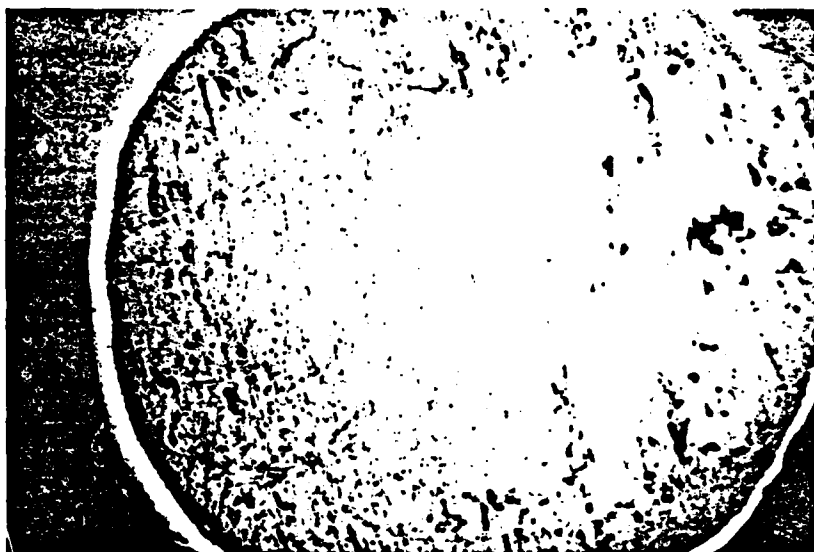


FIGURE 24: Horizontal thin section of Site 77-3 at 130 cm depth.

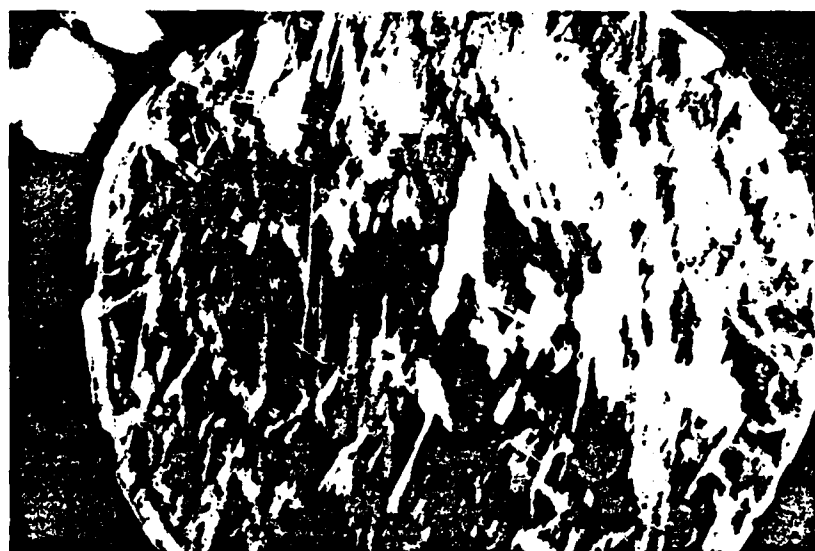


FIGURE 25: Horizontal thin section of Site 77-3 as viewed through polarizing filter.

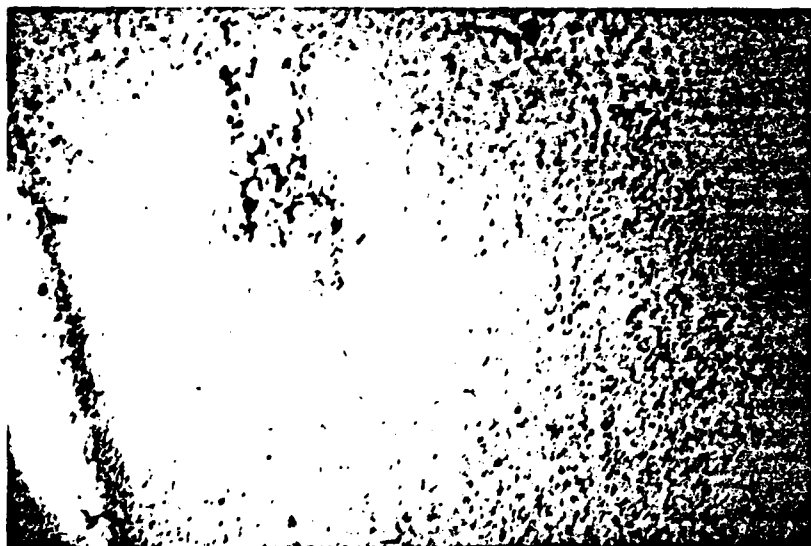


FIGURE 26: Vertical thin section of Site 77-3 at 122 cm depth.



FIGURE 27: Vertical thin section of Site 77-3 at 122 cm depth as viewed through polarizing filter.

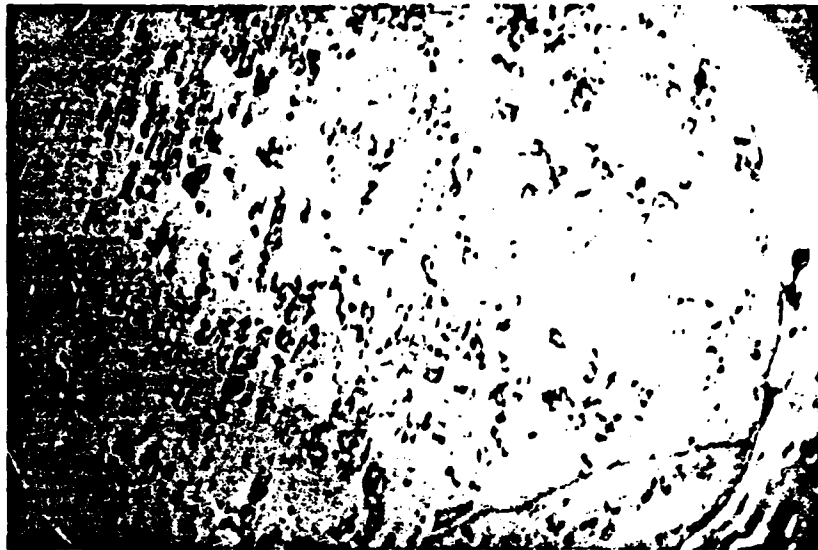


FIGURE 28: Horizontal thin section of Site 77-5 taken at 5 cm depth.

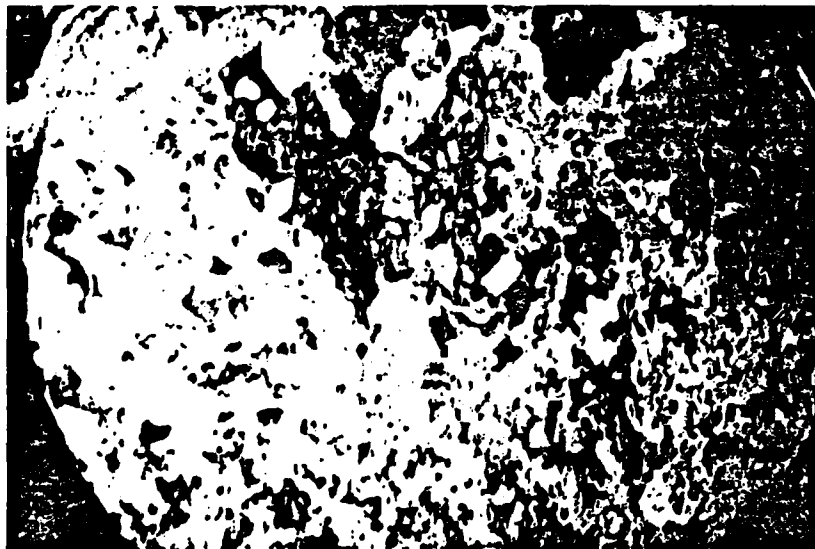


FIGURE 29: Horizontal thin section of Site 77-5 viewed through polarizing filter.

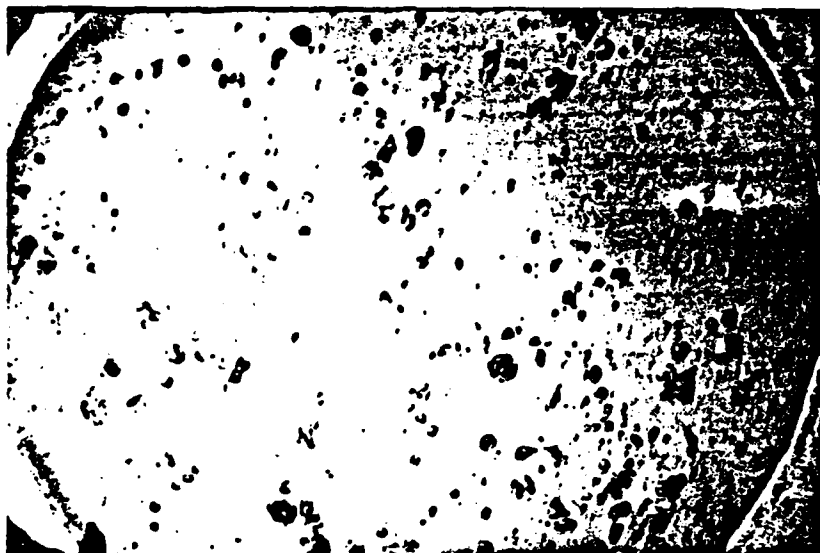


FIGURE 30: Horizontal thin section of Site 77-5 taken at 100 cm depth.

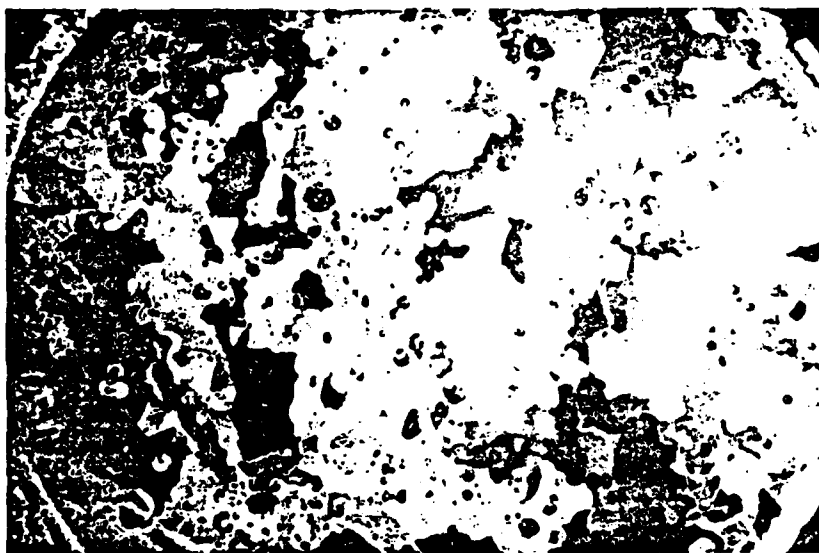


FIGURE 31: Horizontal thin section of Site 77-5 viewed through polarizing filter.

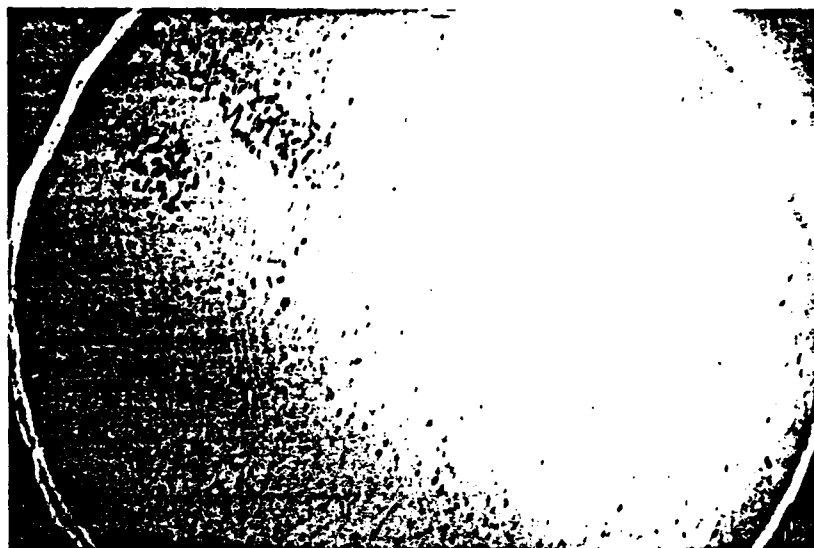


FIGURE 32: Horizontal thin section of site 77-5 taken at 170 cm depth.



FIGURE 33: Horizontal thin section of Site 77-5 viewed through polarizing filter.



FIGURE 34: Vertical thin section of Site 77-5 taken at 170 cm depth.



FIGURE 35: Vertical thin section of Site 77-5 viewed through polarizing filter.

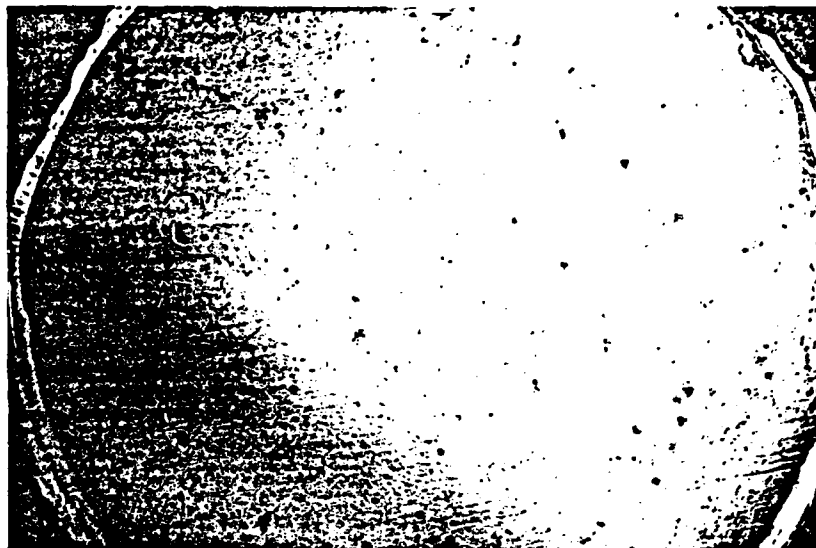


FIGURE 36: Horizontal thin section of site 77-6 taken at 20 cm depth.

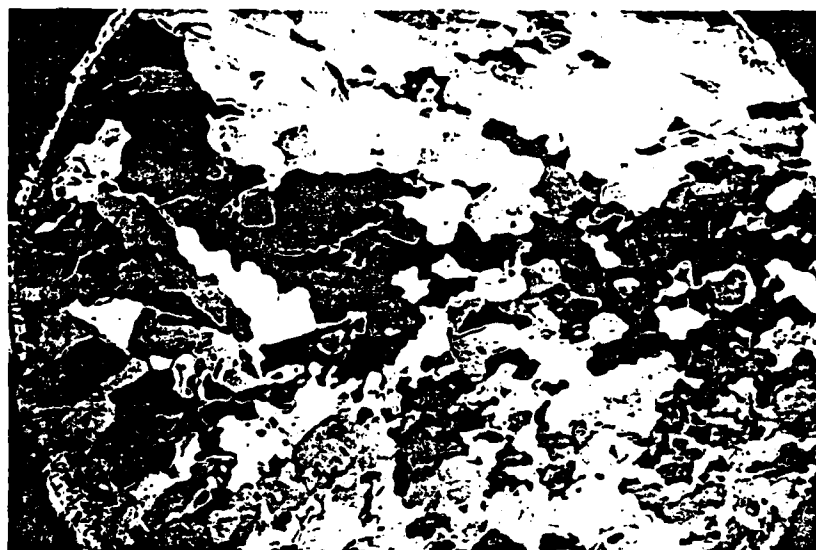


FIGURE 37: Horizontal thin section of site 77-6 taken at 20 cm depth viewed through polarizing filter.



FIGURE 38: Horizontal thin section of site 77-6 taken at 198 cm depth.



FIGURE 39: Horizontal thin section of site 77-6 taken at 198 cm depth viewed through polarizing filter.

CRINC LABORATORIES

Chemical Engineering Low Temperature Laboratory

Remote Sensing Laboratory

Flight Research Laboratory

Chemical Engineering Heat Transfer Laboratory

Nuclear Engineering Laboratory

Environmental Health Engineering Laboratory

Information Processing Laboratory

Water Resources Institute

Technical Transfer Laboratory

Air Pollution Laboratory

Satellite Applications Laboratory

